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This volume contains the Articles named below:—

I. "Useful Plants of the Bombay Presidency." By J. C. Lisboa, Graduate of the Grant Medical College, &c. &c.

II. "Botany of the Bombay Presidency." By Surgeon Major W. Gray, L.M., L. Ch. (Dub.).

III. "List of Gujarát Trees." From materials supplied by G. H. D. Wilson, Esq., C.S., and Lieut.-Colonel J. G. McRae.

JAMES M. CAMPBELL.

August 1886.

PREFACE.

In placing in the hands of the public the *Useful Plants of the Bombay Presidency*, the writer does not claim for it the merit of originality, freely admitting that it is almost entirely a compilation from the various works on Indian Botany that have preceded it. Although nearly every botanical work has been availed of for his purpose, the writer has in the following pages directed references in the main to Brandis' *Forest Flora of the North-West Provinces* and Dalzell's and Gibson's *Bombay Flora* as being the two that are most handy and portable.

The timber trees are arranged in a regular botanical series, according to DeCandolle's system of classification, from descriptions which are found scattered in Balfour's *Timber Trees*, Brandis' *Forest Flora*, Beddome's *Flora Sylvatica*, Hooker's *Flora of British India*; and the writer's knowledge of the plants of some of the districts of the Deccan and Konkan,—like Máthērán, Khandála, Mahábaleshvar, Goa,—together with the dried specimens which he has from time to time obtained from other places, have enabled him to verify and correct these descriptions where necessary.

In describing a tree the writer has invariably given the colour and arrangement of its flowers. This, coupled with the character of the other parts and the native names, will, it is hoped, enable the reader of ordinary intelligence to identify the various trees mentioned in the work.

The altitude of a tree has been given, not in reference to the highest point at which it is seen growing in this presidency, but to the highest point at which it is met with in India. Thus the *Jámbul tree*, which in Bombay is not met with higher than at Sindolla (Mahábaleshvar), has 5000 feet recorded against it, the tree being found to grow at Kámaon, which has the above height.

The heights and girths given in this work are all average measurements. It is very well known that both vary, not only in different places and under different circumstances of climate, etc., but even in the same localities, according to differences of soil, exposure to winds, etc. Thus the *Jámbul*, to which Brandis gives a

height of 70-80 and sometimes 90 feet, is in exposed high situations such as Sindolla, towards and on the slopes of Lingmalla (Mahábaleshvar), but a stunted shrub, bearing fruit scarcely one-fourth the size of that found in the Konkan. *Hymenedyction excelsum* (Karwa, Dandru or Dandeli), which is a large tree in the plains, becomes smaller and smaller as we ascend the Ghâts.

The flowering time (Fl.) and the seasons during which trees ripen their fruit (Fr.) are also subject to considerable variations: *e.g. Millingtonia hortensis*, the Indian cork-tree, is in full bloom in Poona at the end of August, whereas in Bombay it is in flower a month and a half later. In the description of timber trees the writer has not been very precise in the use of some of the technical terms; nor has he, in the enumeration of the characters of timbers, made a distinction between *sap* and *heart* wood, as in a great majority of cases the one gradually merges into the other; and even where the difference is clear, it becomes inappreciable when the timber is not well seasoned, the colour white or yellow becoming brown, dark brown, reddish-purple, or black. As an illustration of the difficulty sometimes thus arising may be mentioned the fact that, with the exception of Dr. Brandis, who describes separately the *sap* and *heart* wood of the first species in the list, *Dillenia Indica*, no other writer on Indian timbers makes this distinction. The wood of the second species, *D. pentaphylla*, is described even by Dr. Brandis without an attempt at separating the *sap* from the *heart* wood.

The description of fruits, vegetables, food, and oil-yielding plants, &c., mentioned in other sections is very short; for their cultivation, the uses and consumption of their products in each province are described in various volumes of the Gazetteer, for which alone the present one is written. Besides, a considerable number consists of the common garden and field plants, which are or may be readily identified by their native names.

The idea of dividing the work into sections has been borrowed from Sir G. C. M. Birdwood's interesting work *Vegetable Productions of the Bombay Presidency*. The writer has, however, not only made alterations and additions to Sir G. C. M. Birdwood's sections, but has introduced several entirely new ones, such as "Plants mentioned in the Religious Books of the Hindus," "Plants or their Products used in intoxicating Fish," "Vegetable Poisons," "List of Herbs, Tubers," &c., used as food by the poorer classes of India during seasons of famine. The Indian medicinal plants are grouped

together according to their properties and uses, the modes of preparation and administration being also briefly given. "Timber trees" occupy more than half the book, thus making the work, the writer hopes, far more useful for reference.

It now only remains for the writer to crave the indulgence of his readers for the irregularities and errors that must of necessity have crept into a work which has been written under failing health and in the short intervals of time snatched from the anxieties of his professional duties. If time and health are permitted him, the writer hopes to correct these errors in a second edition of the work.

J. C. LISBOA.

Bombay, January 1886.

CONTENTS.

ABBREVIATIONS.

Alt. = altitude.

Fl. = flora; flowering time of a plant.

Fr. = time of ripening fruit.

T. T. = timber trees.

The other abbreviations will be easily understood.

ADDENDA.

Among "Religious Plants," in the last place, *read* :—

Sarcostemma brevistigma, Dalz. & Gibs. Bby. Fl. 149. *Soma*.

"The Soma of the Vedas, its name being derived from the circumstance that it was gathered by moonlight by the ancient Hindus. They carried it to their homes in carts drawn by rams; and a fermented liquor was prepared by mixing its juice, strained through a sieve of goat's hair, with barley and ghee. This wine was drunk at all their religious ceremonies, and was used as an intoxicant by the rishis, who, in the golden age of Hinduism combined it at their meals with beef."—Birdwood.

Roxburgh says :—"This plant yields a larger portion of very pure milky juice than any other I know; and, what is rare, it is of a mild nature, and acid taste. The native travellers often suck the tender shoots to allay their thirst."

S. brevistigma grows at the foot of Mahábaleshvar and in various other rocky places in India. Whether it is the true Soma of the *Veda* or a substitute for it introduced in modern times, is difficult to say; but the description of *Soma* (Zend., *Homa*) given in *Áyur-Veda* as translated by F. Max-Müller points to a plant of the genus *Sarcostemma*.

We have in India, besides the above-mentioned plant, *Sarcostemma intermedium* and *S. Brunonianum;* the latter, eaten as salad by the natives, is found in the Deccan ascending to 4000 feet on the Neilgherries. Some dry twigs, sent to the writer by Mr. Kursetji R. Cama, of what he calls Homa slightly resemble those of this species and of *S. intermedium*.

S. Stocksii grows in Sind.

There is another leafless asclepiad, *Periploca aphylla*, which is common in Afghanistan, ascending to 3000 feet on the mountains of Persia. Whether it possesses acid juice is not known.

Since writing the above, the twigs used as *Soma* have been identified as belonging to *Ephodra vulgaris*, of Gnetaceæ, which is found on dry stony hills in Afghanistan, Beluchistan, parts of the Himálayas, Jhelam, Chenab, and Sutlej; also at Khamaon and inner Sikkim.

ERRATA.

Page.	Line.	For	Read
1	3	of their leaves.	of their flowers.
2	13	and are eaten	and is eaten
,,	35-36	Flowers brown tomentose, axillary,	Flowers axillary,
,,	41	jarge,	large,
3	42	stock	stalk
4	33	2½-3 in., thick	2½-3 in., linear-oblong, thick
,,	37	about ½-1 in.;	about ½ in. ;
6	9	5-lobed,	5-valved,
9	9-10	contain large	contain a large
,,	12	but it is chiefly	but they are chiefly
,,	23	galls as mordant.	galls as a mordant.
,,	32	sagittate, purple. Female	sagittate. Female
,,	48	Stamens 10,	Stamens 8 or 10,
10	30	hermaphrodite, larger, terminal	terminal
,,	42	aril, succulent.	aril succulent.
11	25	of yellow juice	of a yellow juice
,,	44	but does not	but do not
,,	46	of yellow	of a yellow
12	28	are somewhat shorter,	or somewhat shorter ;
13	47	gnn-sticks,	gun-stocks,
14	2	Oblong-lanceolate	ob-lanceolate
,,	49	1¾-2½ in. long,	1¾-2½ in. long by ¼-¾ in.,
15	5	resembling Spanish	resembling the Spanish
,,	17	7-nerved.	7-nerved ; petiole 1-3 in.
,,	20	7-14,	7-10,
16	38	size, close to	size close to
,,	43	Bractcoles	Bracteoles
,,	45	clodded	clothed
17	8	and is said	and are said
,,	26-27	each bearing	each division bearing
,,	30	Capsule 6-7 in.,	Capsule 4-6 in.,
,,	43	scabbard	scabbards
18	12	leaflets 3-4	leaflets 5-7
19	1	villous. Style stalked, curved.	villous. Ovary stipitate. Style curved.
20	23	(also called Katira)	(also called Katira. *Vide* p. 6. line 19)
,,	24	but not	but is not
21	10-11	numerous, small, surrounding	numerous, surrounding
22	2-3	Campanulate, urceolate,	Campanulate or urceolate,
,,	4	anthers, with 2	anthers, each with 2
,,	28	claws ;	claws,
,,	46	Leaves 2-6	Leaves 3-6
23	40	P. heyneanum	P. Heyneanum
24	32	yellow on peduncle	yellow, on peduncle
,,	50	5-7 by 4	5 by 4
25	20	gun-sticks	gun-stocks
,,	22	Budjari-dha-mun.	Budjari-dhamun.
26	26	3-antheriferous	8-antheriferous
,,	45	liliæfolia	tiliæfolia
27	8	Ovary 4-celled,	Ovary 2-4-celled,
,,	26	Fihres	Fibres
,,	30-31	Cordate or broad ovate, rotundate,	Cordate, broad-ovate or rotundate,
28	35	Flowers ⅓ in.	Flowers ⅓-½ in.
29	31	obovate and	obovate, obtuse at the apex and
30	45	yellowish-green,	yellowish-white,
31	19	2 in.; oblong-	2 in. ; ovate, oblong-
,,	39	dots,	dots ;

ERRATA.

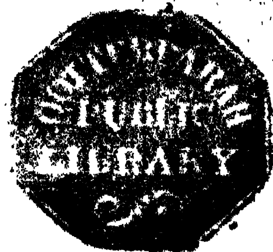
Page.	Line.	For	Read
31	40	yellowish-green,	yellowish-white,
32	7	For. Fl. 46.	For. Fl. 48.
,,	16	Style thick	Style slender,
33	6	obtuse, notched,	obtuse or notched,
,,	9	Flowers $\frac{1}{2}$ in.	Flowers $\frac{1}{6}$-$\frac{1}{2}$ in.
,,	11	Stamens 10,	Stamens 8-10,
,,	16	1-2-celled ;	1-2-celled by abortion ;
,,	18	Panvar	Parvar
,,	34	10,	8,
34	4	$\frac{1}{3}$-1 in.	$\frac{1}{3}$-$\frac{1}{2}$ in.
,,	32	10-12, inserted	10-12, usually 10, inserted
35	12	racemes.	panicles.
,,	43	broad falcate-	broadly falcate-
36	19	nearly 3 lin.	nearly 4-5 lin.
,,	46	4-5 small,	4-5, usually 4, small,
37	34	1$\frac{1}{4}$-1$\frac{1}{2}$ in.	1-1$\frac{1}{4}$ in.
40	1	obtuse, obscurely	obtuse, sessile, obscurely
,,	3	Flowers subsessile,	Flowers minute, subsessile,
,,	6	large. Drupe	large, wanting in male flowers, Drupe
,,	30-31	3-4, much	3-4, usually 3, much
41	28	M. azedarach,	Melia azedarach,
42	31	$\frac{3}{4}$ in.	$\frac{5}{8}$ in.
,,	32	puberulous panicles.	puberulous or glabrous panicles.
,,	34	hairy.	hairy or white tomentose.
43	7	than the leaves.	than the leaflets.
,,	27	globular.	globular ; anthers 6.
,,	48	stamens	anthers
,,	52	seeds 3-4 covered	seeds $\frac{3}{4}$-covered
44	5	as firewood.	for firewood.
,,	13	small, white,	small, 4, rarely 5-merous, white,
,,	24	Leaflets 1-4	Leaflets ternate, 1-4
,,	36	fish ; and the fish	fish ; the fish
,,	42	oblong,	oblong or lanceolate,
,,	46	Petals 5,	Petals 4-5,
,,	48	10,	10, rarely 8,
45	23	Flowers greenish-	Flowers about $\frac{1}{8}$ in., greenish-
,,	48	terminal axillary	terminal and axillary
,,	49	Calyx 5 dentate.	Calyx 4-5-dentate.
46	21	beneath, on a rather long petiole	beneath ; base obtuse on a rather long petiolule.
,,	52	on long villous	on short villous
47	3	with 8 ovules	with about 8 ovules
,,	19	silky pubescence	silky pubescent
48	28	Wightiana.	Wightiana, Dalz. & Gibs. Bby. Fl. 143.
,,	30	ovate elliptic or	ovate elliptic, narrow oblong or
49	29	peduncles longer	peduncles somewhat longer
,,	44	former as a	former is a
50	16	Xylocarpus	Xylopara
51	2	Sepals 4,	Sepals usually 4,
,,	22	ovoid, unarmed	ovoid, apiculate, unarmed
,,	37	long, pari-pinnate	long, normally pari-pinnate
,,	43	Petals covered	Petals 4-5, covered
,,	45	hairs. Fruit	hairs. Stamens 8. Fruit
52	6	and the uses	and their uses
,,	36	Stamens 6-8 ;	Stamens 6-8-10 ;
53	44	Drupe compressed,	Drupe slightly compressed,
54	2	but durable	durable
54	12	by $\frac{1}{2}$ in.,	by 1$\frac{1}{2}$-$\frac{1}{2}$ in.,
55	47	short.	shorter.
,,	48	1 in.	[illegible] in.
56	14	Stamens 4.	Stamens usually 4
,,	22	sweet oil	sweet pulp
,,	23	Pers. ;	Willd. ;

Page.	Line.	For	Read
56	32	much-branched	sparingly branched
,,	49	sub-opposite,	sub-opposite elliptic,
57	31	used as	used as a
,,	37	have much	have a much
58	16	Corolla ¼-¾ in.	Corolla ½-¾ in.
,,	34	1 ft. or more	1 ft. long or more
59	10	with yellow	with a yellow
,,	22	largest,	larger,
,,	23	cuspidate,	cuspidate at the apex,
,,	27	long; the blado 1 in. broad; wings and	long; wings and
,,	29	blackish, 1-8	blackish, with 1-8
,,	31	Polynasia.	Polynesia.
,,	44	in petiole	on a petiole
,,	47	base, larger, as long	base, as long
60	25	3-4 lin.	3-4 lin. or longer.
,,	52	by ¼-1 in.	by ¼ to ½ in.
61	8	its leaves.	their leaves.
62	10	5-7, obtuse,	5-7, elliptic obtuse,
,,	14	articular.	orbicular.
63	23	Pod 3-7 in.	Pod 3-7 by ½ in.
64	18	Bby. Fl. 82	Bby. Fl. 83
65	16	by 1 in.,	by ½-1 in.,
,,	28	pinnæ 2;	pinnæ 2 with a raised gland between;
,,	30	dense peduncled heads	dense heads
,,	50	scarlet red, shining,	scarlet, shining,
66	44	Leaf-rachis	Common petiole
67	37	tomenotsa	tomentosa
,,	44	with a bract	bracted
68	4	leaflets	leafless
,,	26	Leaf-rachis ¼ ft.	Common petiole ¼-½ ft.
,,	27	and several smaller	and smaller
,,	46	Leaf rachis glabrous or pubescent,	Common petiole glabrous,
69	7	Bed.	Bed. Fl. Sylv. t. 51.
,,	10	Leaf-rachis	Common petiole
,,	10-11	on the common petiole	on it
,,	12	¼-⅓ in.	¼-⅓ in.
,,	27	¼-2½ in.	½-2½ in.
,,	32	Pod ½-2.	Pod 1-2.
,,	42	Pinnæ 6-16,	Pinnæ 6-8,
,,	43	¾ in.	¾-1 in.,
70	12-13	Flowers white	Flowers yellowish-white
,,	31	reddish-brown	brown
,,	46	½ in.,	¼-½ in.,
,,	48	velvety, pubescent.	pubescent.
71	33	Calyx a line long.	Calyx half a line long.
72	7	Hook.; Hook.	Hook
,,	8	Bby. Fl. 82	Bby. Fl. 89.
,,	14	limb 10-12	limb with 10-12
,,	16	, 1-1½,	; fruit 1-1½ in.,
,,	41-42	Leaves shortly, oblong-elliptic or oblong lanceolate.	Leaves oblong elliptic, or short-acuminate
,,	50	smoothish.	smoothish, with 6 prominent angles.
73	32	at the base, often	at the apex, often
,,	53	Fl. 91	Fl. 223
74	2	acute and	acute at the apex and
75	47	dense, terminal, forming	dense, forming
76	16	on hedges	in hedges
,,	,,	30-30.	30-35
,,	35	during the whole of the	during the
77	11	cordate at the apex	cordate at the base
78	6	malaccenses	malaccensis
	16	½-⅓	⅓-½

Page.	Line	For	Read
78	20	1-$\frac{1}{2}$ in.	$1\frac{1}{2}$ in.
,,	28	For. Fl. 225	For. Fl. 235
79	20	the leather	leather
,,	22	Linn. ;	Roxb. ;
80	8	arhitish	whitish
82	28	$\frac{1}{2}$-$1\frac{1}{2}$ in.	$\frac{1}{3}$-$1\frac{1}{8}$ in.
84	21	II. 27—	III. 27—
,,	27	1 in. diam., four	$1\frac{1}{4}$ in. diam. and four
,,	40	Calyx $1\frac{1}{2}$ in.	Calyx $\frac{1}{12}$ in.
,,	48	ripens ; fruit	ripens fruit
88	15	make	makes
,,	50	Fl. 139	Fl. 138.
91	35	12.	6-8
,,	46	Linn ; Dalz.	Linn., Brand. For. Fl. 293.
,,	,,	Bly. Fl. 293	Bby. Fl. 140.
92	24	petiole $\frac{1}{4}$-1 in.	petiole 1-$1\frac{1}{2}$ in.
93	42	8 stamens ;	8 staminodes ;
95	21	terminate,	turbinate,
96	30	For Fl. 301.	For. Fl. 300.
97	6	Leaves 3-4 in.	Leaves 2-4 by $2\frac{1}{2}$ in.
,,	10	about $1\frac{1}{2}$ in.	about $\frac{1}{2}$ in.
,,	21	in pari-pinnate	imparipinnate
,,	,,	with the old one	with an odd one
,,	,,	3-4 in.,	3-4 in. by 2.
,,	26	Corolla $\frac{1}{2}$ in.	Corolla $\frac{1}{4}$ in.
99	31	$\frac{3}{4}$ in. long.	$\frac{1}{2}$ in. long,
,,	45	divancate.	divaricate,
100	48	1-$1\frac{1}{2}$ ft. long,	1-2 ft. long.
,,	49	about $\frac{1}{4}$ in.	about $\frac{1}{4}$-$\frac{1}{3}$ in.
101	10	4-8 by $2\frac{1}{2}$-$3\frac{1}{2}$ in.	6-12 by $2\frac{1}{2}$-5 in.
,,	12	1-$1\frac{1}{4}$ in.	1-2 in.
102	19	leaves soft pubescent	leaves sparingly soft pubescent
103	19-20	almost orbicular, cordate	cordate
104	21	Leaves 1-$2\frac{1}{2}$ ft.	Leaves 2-3 ft.
,,	25	3-$3\frac{1}{4}$ in., long,	3-$3\frac{1}{4}$ in. long,
,,	,,	pure, white	pure white,
,,	39	3-4 in.,	3-4 by $1\frac{1}{2}$ in.
105	8	leaflets 2-3 pair	leaflets 2-3 pair with an odd leaflet ;
,,	12	10-14 by 3-4 in.	10-14 by $\frac{3}{4}$-$\frac{7}{8}$ in.
,,	23	petioles 1-2 in.	petioles $\frac{1}{2}$ in.
,,	37	2-$2\frac{1}{3}$ by $1\frac{1}{2}$ in.	$4\frac{1}{2}$ by 2 in.
,,	46	Hook. ; Dalz.	Hook. ; Bignonia Xylocarpa. Dalz.
106	4	smooth. Seeds	smooth. Capsule 1-$2\frac{1}{2}$ ft. long, woody. Seeds.
,,	14	Leaves 12-24,	Leaves 12-24 in. long,
,,	16	petiole	petiolule
,,	21	by 3-4 in.	by $\frac{3}{4}$ in.
109	25	clothing	clothes
111	41	alternately	alternate,
112	41	Leaves 3-9	Leaves 5-9
,,	46-47	Fruit somewhat like an acorn, oblong,	Fruit oblong,
,,	47	cup.	cup, size of a pea, red when ripe.
114	11	Leaves 6-12.	Leaves 6-12 in. long,
,,	25	Leaves 6-12 in.	Leaves 4-6 in.
115	17	3-8 lin.	3-18 lin.
,,	44	myrobalan	myrabolan
116	21	numerous-fascicled,	numerous, fascicled,
,,	31	Golchidion	Glochidion
,,	44	DeCandolle,	DeCandolle Prod.,
117	12	This tree	This shrub
118	16	peduncle	petiole
120	41	densely, rufovillous	densely rufovillous,

Page.	Line.	For	Read
121	35	and destitute	and is destitute
122	7	They yield	It yields
,,	15	Leaves 4-9	Leaves 4-7.
,,	46	evergreen ree	evergreen tree
123	38	R. decocca	R. dicoca
,,	42	Cleidon	Cleidion
124	38	stamens 10-14 in.,	stamens 10-14, in
,,	46	285 ; Brand.	285 ; Dalz. & Gibs. Bby. Fl. 228 ; Brand.
125	16	found run wild	found wild
,,	24	Khinna.	Khinna, udá.
,,	43	Hurna.	Hurá.
126	14-15	Cenocephalus	Conocephalus
,,	17-18	sinuate	serrate
127	20	sides with minute red dots; petiole	sides ; petiole
,,	21	Female axillary	Female solitary, axillary,
128	14	Bby. Fl. 224	Bby. Fl. 244
129	21	into trunk	into trunks
,,	45	Leaves 4-8 in.,	Leaves 4-8 by 2-4 in.,
,,	47	2-3 in.	1½-2 in.
130	34	U. bengamonium,	U. benjamineum,
132	6	Flowers greenish,	Flowers greenish-white
,,	,,	deciduous	dioicous
,,	15	Holoptelea	Holopteləa
,,	44	Samaroid careopsys	seeds
133	20	in the gunpowder	in gunpowder
,,	28	absolutely	obsoletely
,,	39	and the poles	and poles
134	31	greenish	greenish-yellow,
135	4	reddish-yellow	orange-yellow
,,	24	brownish, stinging	brownish, with an acrid sting-ing pulp
136	46	sheaths striated	sheaths of branches striated
,,	51	2-8-flowered	2-5-flowered
137	6	wottle	wattle
,,	20	8-12 in.	8-12 lin.
,,	23	Caryopsys	Caryopsis
,,	43	at the margin	at the top
138	2	sheaths striated	sheaths of shoots and young culms striated
,,	5	sheaths hirsute.	sheaths of leaves hirsute.
,,	17	wottle works	wattle works
141	45	members	readers
142	52	cases had lasted	cases the symptoms had lasted.
,,	55	members	readers
152	6	and is	and are
155	14	that	that the
,,	23	Eribotra	Eriobotrya
156	15	the streams	streams
158	29	some of the Indian botanists	some Indian botanists
161	10	the substitute	a substitute
162	34	Coffea siberica	Coffea Iberica
163	34	Mychrorhyncus	Microrhynchus
166	6	in a small	in small
168	4	Sirvan	Sewan
170	21	is only	only is
172	2	and has	has
173	22	vitez	vitex
174	5	azadarach	azedarach
,,	13-14	Belgaum	(Belgaum)
,,	29	desert	dessert
175	3	yield	yields
182	2	Milit	Melet.
,,	13	endemic	indigenous
,,	17	acres	acris

Page.	Line.	For	Read
182	18	Tontanesii	Fontanesii
183	10	Thyphinæ	Typhaceæ
185	18	over	on
188	2	30-50 ft.	30-50 and even 70 ft.
191	20	toxicana	toxicaria
193	6	on	in
196	39	are	and
198	1	over tropics	over the tropics
199	19	preparatim	preparation
,,	26	Cactaceæ	Cacteæ
200	40	Glossocardi	Glossocardia
205	54	form	forms
206	3	mucilagenous	mucilaginous
207	16	of arum	of the arum
,,	19	above	before
,,	38	follow	follows
208	12	root	roots
218	14	yield	yields
221	16	a useful	an useful
227	37	In passing	On passing
228	34	G. acurminatum	G. acuminatum
235	35	half of it stuff	half stuff
237	31-32	and the footstalks	the footstalks
239	3	stem	stems
241	35	Melia azadirachta	Azadirachta Indica
,,	38	yields	yield
242	4	Bhor	Bhor. The bark is used by tanners as a dye-stuff.
,,	5	Guti	Guti. The bark and fruit are employed for tanning and for making blacking.
,,	last	Wrighta	Wrightia
243	19	Dalz. & Gibs. Bombay Fl.	Bedd. Fl. Sylv. t. xxii.
245	3	myrabalans	myrabolans
247	38	dye	dry.
255	29	on	in
258	1	are given	given
262	16	of	as
,,	11	Exacuum	Exacum
265	38	for variety	for a variety
273	8	Myrsineæ	Omit the word
276	8	gurat	guvat
,,	12	Spicillaria	Penicillaria
,,	last	in the cattle	in cattle
283	30	on page	at page
286	42	over the doors	over doors
,,	48	Eloecarpus	Elæocarpus
292	19	gometti	gametta
,,	20	idol of cobra	idol of a cobra
,,	21	his	its.



USEFUL PLANTS

OF THE

BOMBAY PRESIDENCY.

TIMBER TREES.

DILLENIACEÆ.

This order is represented in this Presidency by two timber trees, both remarkable for the grandeur of their foliage and the showiness of their leaves.

Dillenia Indica, Linn.; Brand. For. Fl. 1.—*D. speciosa,* Dalz. & Gibs. Bby. Fl. 2. *Mota karmal, karambel.*

Young shoots silky. Leaves 8-10 by 2-4 in., approximated towards the ends of branches, acute, sharply serrate, with numerous parallel stout veins ending in points of serratures; almost coriaceous, glabrous above, pubescent beneath, especially on the nerves. Petiole 1-1½ in., channelled. Flowers solitary, about 5-6 in. diam., pure white on pubescent peduncles 2-3 in. Sepals orbicular, concave, thick and fleshy. Petals obovate. Inner stamens longer and recurved, outer erect. Carpels 20. Fruit round, size of a cocoanut. Seeds compressed.

Not uncommon in the Konkan, in Alíbág, Sávantvádi and Goa, and also in all tropical forests of South India, Bengal, Nepaul to Assam, Ceylon, Burma and the Malayan Archipelago. Alt. 1000 ft.

It attains the height of 30-50 ft. and a girth of 3-5 ft. An evergreen tree. Fl. June-July; Fr. ripens about February.

The wood is reddish-brown, hard, close-grained and strong; valuable on account of its durability under water; occasionally used for gunstocks, house- and ship-building, and as firewood. It makes a good charcoal. The fleshy sepals have an agreeable acid taste, and are eaten raw or cooked, or made into sherbet, which is said to be useful for cough. A palatable jelly is also made from them.

D. pentagyna, Roxb.; Dalz. & Gibs. Bby. Fl. 2; Brand. For. Fl. 2. *Karmal, kanagalu.*

A spreading tree. Leaves oblong-lanceolate, 1-2 ft. long (on shoots and young trees up to 5 ft. long) by ½-1 ft., tapering into a broad half amplexicaul petiole 1-3 in., denticulate, with numerous parallel veins, silky-downy when young, glabrous and shining when old. Flowers umbelled, 1 in. diam., sweet-scented, yellow, on

Timber Trees.

slender pedicels 1-2 in. long, arising from tuberosities on old branches. Petals obovate. Carpels and styles 5. Fruit globular, size of a cherry, smooth, orange-yellow.

Southern Marátha Country and on the west side of most of the hill forests of the Konkan, also along the base of the Himalayas from Oude and Behar to Assam, South India, Bengal and Burma. Alt. 2000 ft.

Attains 60-70 ft. in height and a girth of 6-8 ft. Sheds its leaves in March-April; comes in flower soon afterwárds. Fr. ripens in the beginning of the rainy season.

Wood very strong, hard, heavy, porous, coarse-grained, durable, of a light-pinkish colour turning to light-brown; used for house- and ship-building, buggy-shafts, rice-mills and charcoal. The berry has an agreeable acid flavour resembling somewhat that of *Grewia asiatica*, and are eaten raw or cooked. The leaves, which are sold in the bázárs of Poona and elsewhere, are used as substrata for thatched roofs and also as fodder. The old rough leaves of this and the preceding species are also employed to polish ivory and horn. Cordage is made of the bark.

MAGNOLIACEÆ.

We have only one species on this side, which is the well-known

Michelia champaca, Linn.; Brand. For. Fl. 3. *Champa.*

This evergreen tree is cultivated everywhere for the sake of its fragrant yellow flowers. Alt. 3-5000 ft.

It attains the height of 30-60 ft., and in favourable places up to 100 ft.; girth 7-9 ft. Fl. all the year round, but chiefly in May. Fr. in the cold season.

The wood is soft, mottled, light olive-brown, polishes well, and is adapted for handsome furniture. Used in some parts for carriages, palanquins and buildings.

ANONACEÆ.

This order yields the following timber trees:—

Unona pannosa, Dalz. in Hook. Kew Jour. Bot. iii. 207; Bedd. Ic. Pl. Ind. Or. t. 52.

Young parts puberulous. Leaves 2¼-4 by ¾-1½ in., ovate-lanceolate, obtusely acuminate, rounded or acute at the base, glabrous above, pubescent beneath, thin, pellucid-dotted. Flowers brown-tomentose, axillary, of a dirty-white colour, on very short peduncles, surrounded with one or more scaly bracts. Sepals ovate-acute, 3 lines long, villous on the outside; petals 1½-2 in. long, lanceolate, villous, inner narrower and shorter. Ovaries 8-12, densely strigose; ovules 2-4. Carpels 5-6, oval-obtuse, subsessile, pubescent. Seeds 1-3, large, shining.

This tree is common in the forests of the Konkan, chiefly about Talwaddi-Sahyádri and in Travancore. Alt. 3500 feet. Fl. in October.

Wood is good, tough and strong, and a good fibre is extracted from the inner bark.

Polyalthia longifolia, Benth. & H. f.; Brand. For. Fl. 5.—*Guatteria longifolia*, Dalz. & Gibs. Bby. Fl. Suppl. 2. *Asôk, asoka, asūpala, devadaru.*

Timber Trees.

Glabrous. Leaves 5-8 by 1-2 in., narrow-lanceolate, long-acuminate, waved, shining above, pellucid-dotted, membranous, glabrous, on a petiole ¼-⅓ in. Flowers numerous, yellow-green, on long slender pedicels; umbellate, on hoary peduncles, ½ in., arising from short, leafless, tuberculate branchlets; bracts minute-linear. Sepals broad-ovate; petals equal, narrow-linear from a broad base. Carpels ovoid, ¾ in., obtuse at both ends, on stalks ½ in., stout, glabrous.

This beautiful evergreen tree is indigenous in Ceylon, and is extensively planted in avenues along the roads in Bombay and other parts of India.

In some places it attains the height of about 50 ft. and a girth of 6 ft. Fl. February-May; Fr. July and August.

Wood whitish-yellow, light, tolerably close and even-grained; used for making drum cylinders.

P. cerasoides, Benth. & H. f.; Brand. For. Fl. 5.—*Guatteria cerasoides,* Dalz. & Gibs. Bby. Fl. 3. *Hūm.*

Young parts tomentose. Leaves 3-8 by 1-2 in., distichous, oblong-lanceolate, acuminate, membranous, acute or rounded at the base, dark-green, glabrous above, pubescent beneath; petiole short, tomentose. Flowers greenish-white, about 8-10 lines diam.; peduncles $\frac{1}{12}$ in., woody, arising from axillary tubercles; pedicels ½-1 in., slender, with a few basal imbricating scales and sometimes 2-3 oblong or ovate bracts. Petals hardly longer than sepals, ovate or linear-oblong, thickly coriaceous, puberulous. Carpels numerous, size of a small cherry, dark-red, on slender stalks ¾ in. long.

Found on Thall Ghát, Jawhár forest, Madras and Behár.

This evergreen tree sometimes attains a great height. Fl. February-May; Fr. end of rainy season.

Wood whitish, hard, close-grained, used by carpenters, and in making boat masts and small spars.

P. fragrans, Benth. & H. f.—*Guatteria fragrans,* Dalz. & Gibs. Bby. Fl. 4.

Young branches hoary. Leaves 4-9 by 2-5 in., membranous, oblong-lanceolate, acuminate, rounded at the base, generally oblique on petiole about ⅓-⅜ in. long, very prominently veined, especially beneath, glabrous above, slightly pubescent on the costa beneath. Flowers fragrant, white or yellowish-white on peduncles about 1 in. long, from the axils of fallen leaves or on woody tubercles, cymose, 5-12-flowered, puberulous; pedicels 1 in. long, slender, hoary; bracts cup-shaped about the middle. Sepals small, rotundate; petals 1-1½ in. long, narrow, attenuated at the apex. Carpels 10-20, 1-1½ in., broadly oblique-ovoid, hoary, on a stock 1-1½ in. long.

A large tree found in the jungles of Sivapore, Sávantvádi, Malabár and the South Kánara Ghâts. Fl. in the cold season.

The wood requires examination.

Goniothalamus cardiopetalus, Bedd. Ic. Pl. Ind. Or. t. 62.—*Polyalthia cardiopetala,* Dalz. in Hook. Kew. Jour. Bot ii. 39.

Branches slender, leafy. Leaves 6-9 by 2-3 in., aromatic, linear-oblong, abruptly-acuminate at the apex, acute at the base, thin,

Timber Trees. coriaceous, undulated at the margin; petiole ⅛ in. long. Flowers reddish, 1 in. diam., on supra-axillary, solitary or superposed peduncles ¼-½ in. long. Sepals small, pubescent, broadly-ovate, outer petals cucullate-clawed, ovate-lanceolate, 8 lines long, denselybrown-tomentose, inner ones ⅓ shorter, tomentose. Styles slender, 2-fid, carpel 1-seeded.

It is a small tree or a large shrub found in the Southern Marátha Country, Coorg, Kánara Gháts and Wynaad.
The timber is used for posts.

Saccopetalum tomentosum, Hook. f. & Th.; Dalz. & Gibs. Bby. Fl. 4; Brand. For. Fl. 7. *Kirna, karri,* and also called *hūm* by the natives.

Young shoots clothed with soft silky tomentum. Leaves 4-6 by 2½-3 in., elliptic or ovate-oblong, acute at the apex, rounded or cordate at the base, sometimes glabrous when old and somewhat rough above, pubescent and pale beneath, on petioles ¼ in. long. Flowers greenish-yellow with a broad streak of brown; in leaf-opposed or sub-terminal 2-4-flowered cymes, on short peduncles ¼-½ in.; pedicels slender, downy, 2-3 in. Sepals and outer petals ⅛ in., nearly equal, lanceolate, inner petals ⅝ in., oblong, obtuse, downy, saccate at the base. Carpels 1 in. diam., purple-tomentose, 3-4-seeded, on stalks ¼-½ in.

Forests of the Konkan, Travancore, and also at Behár, Orissa and Terai of Nepaul.
A large tree attaining in some places a height of 50 ft. with a girth of 5-6 ft. Fl. hot season; Fr. rainy season. Leaves are shed in March and renewed in April.
Wood greenish-yellow, strong, hard, close-grained and durable; valued for building purposes, as it does not warp. The leaves are used as cattle fodder.

Bocagea Dalzellii, H. f. & Th.—*Sageræa laurina,* Dalz. & Gibs. Bby. Fl. 2. *Sajiri.*

Branches glabrous. Leaves 5-9 by 2½-3 in., thick coriaceous, acute or obtuse at the apex, rounded or slightly attenuated at the base, glabrous and shining above, pale beneath. Flowers white, bisexual, crowded, in fascicles of 1-15 on woody tubercles; pedicels about ½-1 in.; bracteoles several, scaly, basal. Sepals orbicular, cohering at the base. Petals ½ in., broad-ovate, concave. Stamens 12-18. Ripe carpels 1 in. diam., globose, glabrous, smooth, subsessile.

Mátherán, Nágotna, Jawhár, and all along the forests of the Konkan and Travancore. Alt. 2500 ft.
It is a beautiful ornamental laurel-like tree. Fl. October-November.
The timber is of a reddish colour, close-grained, useful for fancy work.

CAPPARIDEÆ.

This order is represented by several plants, but most of the species are shrubs.

Capparis aphylla, Roth.; Dalz. & Gibs. Bby. Fl. 9.; Brand. For. Fl. 14. *Kiral, sodada.*

Straggling, much-branched glabrous shrub or small tree; thorns twin, nearly straight, brown. Leaves ⅛-½ in. long only on young

shoots, caducous, sessile, linear-subulate, pungent. Flowers 1 in. diam., red-brown or scarlet, in many-flowered corymbs, on very short lateral shoots. Sepals unequal, the inner sepal larger and saccate, subvalvate. Petals ovate, longer than sepals. Stamens 8-20; filaments long-filiform. Ovary on a gynophore ½-¾ in. Style subulate. Fruit ovoid or globose, red, size of a cherry, long-beaked. Timber Trees.

Common in Cutch, Gujarát and the Deccan as far south as Tinnevelly; also in dry places in the Punjáb, Rájputána, Central Provinces, etc.

It rarely attains the height of 20 ft. and a girth of 4-5 ft., rarely more. Fl. hot season; Fr. November-March.

Wood is whitish or light-yellow, becoming brown on exposure, close-grained, tough and shining. Used in some places for small beams and rafters, oil-mills. It is generally used for fuel, which burns with a strong flame. It is bitter, and therefore not liable to the attacks of white ants. The unripe fruit and flower-buds are used as pickle.

C. grandis, Linn.; Dalz. & Gibs. Bby. Fl. 10; Bedd.Fl. Sylv. An. Gen. 13. *Puchownda, ragota.*

A crooked tree; branches and all young parts grey or yellowish-tomentose, armed with short, slightly-curved thorns or none. Leaves 2-3 by ½-2 in. ovate or obovate, acute at both ends, or rarely obtuse, glabrous on both surfaces when old; petiole ½-¾ in. Flowers ¾-1 in. diam., white, in terminal corymbs or racemes; pedicels slender, 1 in. Sepals tawny, puberulous, unequal. Petals narrow-obovate, unequal. Stamens numerous. Gynophore slender, ⅙-1 in. Fruit size of a nutmeg, globose, purple, 2-6-seeded.

Found in the forts of Sholápur, Miraj, and sparingly on the ghâts and the Deccan, also in several parts of Madras and Ceylon.

It attains the height of about 15 ft., having a thick trunk. Fl. May. Sheds its leaves in the hot season.

Wood is hard and durable; much used for ploughshares and rafters.

Cratæva religiosa, Forst.; Dalz. & Gibs. Bby. Fl. 8; Brand. For. Fl. 16. *Waruna, warvanah, karwan, kmula.*

Glabrous. Leaves trifoliolate, long-petioled, clustered towards the ends of branches; leaflets 3-6 by 1¼-2½ in., ovate-lanceolate or obovate-lanceolate, abruptly or gradually acuminate, on articulate petioles, pale or glaucous beneath. Flowers 2-3 in. diam., white, becoming greenish-yellow, at length purplish, on long filiform pedicels, in many-flowered terminal corymbs. Sepals 4, ovate, deciduous, inserted with the petals on the broad-lobed hemispherical disc. Petals 4, ovate or oblong, obtuse or acute, long-clawed. Fruit 1-2 in. diam., ovate or globose, on a thick gynophore, many-seeded.

Found all over the Konkan, in Malabár, Kánara and Madras; Ceylon, Assam, Burma; cultivated everywhere in India, especially near temples. Alt. 2000 ft.

It attains the height of 30-40 ft., sometimes more, and a girth of 3-6 ft. Fl. in the hot season; young leaves appear in the same season and Fr. in the rainy season.

Wood is white or yellowish-white; when old changing to light-brown; close and smooth-grained, tough, durable and moderately hard. Used for drums, combs, writing-boards and in turnery. The viscid pulp of the fruit is said to be used as a mordant in dyeing; mixed with mortar as a cement.

Timber Trees.

BIXINEÆ.

Cochlospermum gossypium, D. C. Prod. i. 527.; Brand. For. Fl. 17. *Kumbi, ganeri, gunglay.*

Branchlets, young leaves and peduncles, grey-tomentose. Leaves 3-8 in. diam., palmately 3-5-lobed, old glabrous, lobes acute or acuminate, entire; petioles long, thick; stipules linear, caducous. Flowers 4-5 in. diam., bright yellow, on terminal panicles. Sepals oblong, concave, silky. Petals obliquely obcordate, obliquely emarginate or irregularly cleft. Capsule 2-3 in., 5-lobed, size of a goose-egg. Seeds numerous, covered with long cottony hairs.

Commonly planted near temples, and is found in the Deccan, Central Provinces, Bundelkund, Behár, Mysore, Travancore, Prome, etc. Alt. 3000 ft.

It attains the height of 20-30 ft. and a girth of 2-3 ft. Fl. February-April; Fr. June-July. Sheds its leaves in January, new leaves appearing in May.

Wood grey, soft, and light, but not much used. The cotton is used only for stuffing pillows. The white gum which exudes from the trunk is called *katíra*, which is said to be used in the trade of shoe-making.

Scolopia crenata, Clos.; Bedd. Fl. Sylv. t. 78.—*Phoberus crenatus,* Dalz. & Gibs. Bby. Fl. 11. *Hitterlu.*

A middle-sized tree; branches of young trees armed, of old unarmed. Leaves 2-6 by 1-2 in., ovate or elliptic, oblong-lanceolate, obtusely or acutely acuminate, slightly attenuated at the base, glabrous and shining above, pale and reticulate beneath, obtusely crenated, teeth glandular; petiole ¼-½ in. Racemes 1-3 in., axillary, glabrous or puberulous; flowers nearly ½ in. diam., on longish peduncles, which are furnished with 2-3 small deciduous bracts at the base. Sepals and petals 5-6 each, ciliate. Fruit globose, size of a cherry, apiculate.

In the forests to the south of Rám Ghát; also at Goa, Malabár, Kánara, Mysore and Ceylon.

Wood is white, very hard and dense, but liable to warp: used for planks, etc.

Flacourtia ramontchi, L'Hérit; Dalz. & Gibs. Bby. Fl. 10; Brand. For. Fl. 18. *Swadú-kantaka, tambat, kaikun, pahar, bhekal, kakad.*

A glabrous tree, armed with acute-axillary spines 1-2 in. Leaves 2-3½ by 1¼-2¼ in., ovate-oblong, ovate or suborbicular, serrate or crenate, glabrous and shining above, on a petiole 3-5 lin. Flowers 1-2 lins. diam., greenish-yellow, in short racemes or panicles. Styles 5-11, very short, united at the base, radiate. Fruit dark-red or black, pulpy, roundish, about ½ in. long. Seeds 8-16, flat, compressed.

This plant is found in various parts of this Presidency, as well as in Madras and in Bengal and Eastern Archipelago.

Its height is about 20-25 ft., with a short trunk of 4-5 ft. in girth. Fl. November-March; Fr. May-June. Sheds its leaves January-February; new leaves February-March.

Wood red, close and even-grained, durable and not attacked by insects. Used by turners. Combs and agricultural implements are

of it. The fruit is eaten, and the young twigs and leaves are used as cattle fodder. Timber Trees

F. montana, Grah. Cat. Bby. Pl. 10; Dalz. & Gibs. Bby. Fl. 10. *Atták.*

A middle-sized, thorny tree; flowering branches unarmed, softly pubescent. Leaves 5-7 by 2-3½ in., ovate or oblong-lanceolate, obtusely-acuminate, rounded or acute at the base, crenate, coriaceous, glabrous, shining above and hairy beneath, on a petiole ⅓ in. Flowers, male and female, on separate trees, in fascicled densely-pubescent racemes. Disc of male, glandular. Fruit scarlet, size of a large cherry.

Common on the gháts, Kánara and the Konkan. Fl. January-February.

The wood is strong and close-grained, but too small to be of much use. The fruit, which is agreeable and slightly acid, is eaten.

F. cataphracta, Willd.; Dalz. & Gibs. Bby. Fl. 10; Bedd. Fl. Sylv. An. Gen. 16. *Juggom, panawa, talispatri.*

The trunk armed with numerous large compound thorns; branches numerous; the young ones slightly pubescent, generally unarmed, except close to the trunk. Leaves 3-4 by 1-1¾ in., ovate to oblong-lanceolate, acuminate at the apex, rounded or acute at the base, crenate-serrate, membranous, shining, green on both sides, glabrous. Racemes shortly tomentose or puberulous, 5-10-flowered, often arising from the lateral branchlets; a small cordate bract under each pedicel. Male calyx 4-5 partite. Stamens inserted into a glandular convex disc; female calyx of 4-6 spreading sepals, with annular-lobed disc surrounding the ovary. Styles 4-6, short, connate at the base; stigmas dilated, almost horse-shoe-shaped, or capitate. Berry oblong or ovoid, size of a plum, bluish-black, containing 10-14 compressed seeds.

Cultivated and wild in the Konkan, Malabár, South Kánara, Bengal, Assam to Chittagong, Malacca, Singapore and the Malay islands.

It attains 30-50 ft. in height and 3-5 ft. in girth. Fl. January-February; Fr. in May. Sheds its leaves in the hot season.

The wood is rather heavy, brown, hard and close-grained; takes a fine polish. The fruits are slightly acid, and are eaten. *Talishpatri* of the Indian Materia Medica is composed of tender shoots and leaves of this tree, and is much used in diarrhœa and general debility, etc., in ½ drachm doses.

F. inermis, Roxb.; Bedd. Fl. Sylv. An. Gen. 16.—*F. jagomas.* Dalz. & Gibs. Bby. Fl. Suppl. 5. This tree is also called *jagom.*

Trunk short, unarmed. Leaves 4-8 by 2-3½ in., ovate or oblong-lanceolate, acute or acuminate at the apex; acute or rounded at the base, obtusely-serrate, thin, coriaceous, shining, glabrous; petiole ⅓-½ in. Flowers hermaphrodite in fascicled racemes. Disc covered with fleshy, orange-red glands. Stigmas 4-8, 2-lobed. Ovary 5-celled. Cells 2-ovuled. Berry size of a cherry, red, containing 8-10 flattened seeds.

This tree is very ornamental and is found in various parts of this Presidency, generally cultivated; also in Silhet, Singapore, Penang, etc.

Timber Trees.

It attains the height of 40-50 ft. and 4-5 ft. in girth. Fl. in the hot season; ripens its fruit towards the end of the rainy season.

Wood red-brown, heavy, rather hard, but close-grained.

Hydnocarpus Wightiana, Blume; Dalz. & Gibs. Bby. Fl. 11; Bedd. Fl. Sylv. An. Gen. 16. *Kadu-kawut, kawa, kauti* (*khasti* at Goa).

A tall tree; young shoots and racemes usually brown-pubescent. Leaves 4-9 by 1½-4 in., elliptic-oblong or oblong-lanceolate, acuminate at the apex, round, acute or subcordate at the base, acutely serrate or toothed, usually entire, coriaceous or membranous, on a petiole ¼-½ in. Flowers white, axilliary, solitary or racemed, few-flowered. Sepals green, pubescent, unequal, the inner ones longer. Petals broad, ovate, with soft white hairs and scales at the base, broad-ovate, about ½ the length of petals, hairy. Satmens villous at the base. Ovary pubescent. Fruit 2-4 in. diam., pubescent, obtusely-angled, woody, warted. Seeds obtusely angular.

Common in the Konkan, Malabár and all the ghát forests. Fl. in the hot season; Fr. towards the end of rainy season till January.

Wood is said to be good, and is employed for various purposes. The fruit is used in Ceylon to intoxicate fish. From the seeds an oil (*kawa-tel* or *kush-tel*) is extracted, which is used in lamps and in medicine. (*See* Oils.)

PITTOSPOREÆ.

Pittosporum floribundum, W. & A. Prod.; Dalz. & Gibs. Bby. Fl. 44; Brand. For. Fl. 19. *Yekdi* or *yekaddi.*

A small tree; branches often umbelled. Leaves 2-8 by 1-3 in., elliptic or oblong-lanceolate, acute or acuminate, margins waved, thinly-coriaceous, glabrous, shining above, pale below. Flowers numerous, dingy-yellow, small, pubescent, in terminal much-branched compact racemes or corymbs. Sepals obtuse or acute. Petals oblong, obtuse, patent, at last recurved. Capsule ¼ in. diam., glabrous, rugose, about 6-seeded, opening into 2, hard, broad-ovate valves.

Found at Mahábaleshvar and all along the Western Gháts, mostly on dry, rocky sides; also on the Himalayas from the Jumna to Sikkim. Alt. 3500-8000 ft.

A handsome tree, with a short trunk Fl. January-June; Fr. April-September.

Wood light-coloured, strong and tough, but of small size.

TAMARISCINEÆ.

Tamarix gallica, Linn.; Bedd. Fl. Sylv. An. Gen. 20; Brand. For. Fl. 20. *Jhavuka, jhau, lei.*

A tall glaucous shrub or small tree. Leaves minute, scale-like oblong or lanceolate, semi-amplexicaul, glaucous, white-margined. Flowers bisexual, penta-merous, generally white, rarely pink, ⅛ in. diam., short-pedicelled, crowded in slender-panicled racemes at the ends of branches. Sepals much shorter than the petals. Disc 10-toothed, shallow. Ovary somewhat 3-gonous. Styles 3, rather long, slightly connate. Capsules about 3 lin. long.

It grows mostly on sand and gravel along the banks of rivers and near sea shores in Sind, Cutch, Bengal, the Punjáb, Afghanistan, Persia;

Ceylon and Burma. Graham says that it grows abundantly on the banks of the Indus and throughout Cutch and Sind, where it is commonly used as firewood. Alt. 11,000 ft. Timber Trees.

This tree is very ornamental; it attains sometimes the height of 30 ft. and a girth of 3 ft. Fl. in the rainy season; Fr. in the cold season.

Wood whitish, occasionally with a reddish tinge, coarse-grained, rather hard and tough, used for turning and lacquered work; agricultural implements are made of it. It yields a kind of galls known in the bázár as *mai* or *barah mai* (Hind.) or *sumrat-ul-turfa* (Arab.); these contain large quantity of tannic and gallic acids, and are employed successfully by the natives of this country as an astringent in dysentery and diarrhœa; but it is chiefly used as a mordant in dyeing. A strong infusion of them is recommended as a local application to sloughing ulcers. This shrub is also said to yield a kind of manna called *gosan-jabin*.

T. articulata, Vahl.; Brand. For. Fl. 22. *Fras, asrelei.*

Found growing in Sind and the Punjáb and often cultivated. Alt. 1200 ft. It attains the height of 60 ft. in the Punjáb and a girth of 6-7 ft., sometimes 10-12 ft. Fl. May-July; Fr. later in the season. Leaves are shed partly in the cold season; new leaves appear in May.

This tree also yields galls similar to, but smaller in size than, the preceding one; they are known as *chotah mai* (Hind.), *sumrat-ul-asl* (Arab.), and are used also in the same diseases and for the same purposes. The bark is employed for tanning, and the galls as mordant. It also yields manna called *misri-lei*.

T. dioica, Roxb.; Bedd. Fl. Sylv. An. Gen. 20; Brand For. Fl. 21. *Serru, laljhau, pichula, gaz.*

A very graceful shrub or small tree; trunk short, branches with drooping extremities. Leaves small, scale-like, tubular, sheathing, obliquely-truncate and pointed, glabrous, and green. Flowers diœcious, $\frac{1}{8}$ in. diam., numerous, sessile, rose-coloured, in terminal panicled spikes. Bracts acuminate. Male flowers: stamens 5, inserted in the notches of disc, anthers saggitate, purple. Female flowers: stamens abortive, capsule oblong, tapering, $\frac{1}{5}$ in. long.

Cutch, Sind, Bengal, the Punjáb and Burma, and almost all over India near river-beds and the sea-coast. Graham (Cat. Bby. Pl.) states that it is common in the beds of the Konkan and Deccan rivers, and is cultivated in gardens. Alt. 2500 ft.

It attains the height of 6-7 ft., rarely 15 ft. Fl. May-July; Fr in the cold season.

Wood is white with a pinkish tinge, and open-grained. Its chief use is to supply fuel for railways and steamers. It also yields galls and manna like the two preceding species.

T. ericoides, Rottl.; Bedd. Fl. Sylv. An. Gen. 20.—*Trichaurus ericoides*, Dalz. & Gibs. Bby. Fl. 14.

A shrub or small tree; stem slender. Leaves minute, scale-like, sheathing. Spikes terminal, 4-6 in. long. Flowers $\frac{1}{4}$ in. diam., rose-coloured, resembling those of the common heath, hence the specific name. Stamens 10, not exceeding the petals. Capsule $\frac{1}{2}$ in., feathered with long spreading hairs.

This is one of the most beautiful trees of the tribe, often cultivated in gardens. Common in the rocky beds of the Panch Mahals, Deccan and Konkan rivers, and in Madras, Central India, Bengal, Ceylon, etc.

Only used as fuel.

GUTTIFERÆ.

Timber Trees.

The gamboge order is represented in this Presidency by several useful timber trees, some of which are very ornamental.

Garcinia Indica, Chois.—*G. purpurea*, Dalz. & Gibs. Bby. Fl. 31; Bedd. Fl. Sylv. An. Gen. 21. *Kokam, birund, brindão* of the Portuguese.

A tall tree with drooping branches. Leaves 2½-3½ in., obovate or lanceolate, obtuse, acute or acuminate, dark-green, red when young. Flowers yellowish; male flowers in axillary and terminal fascicles on pedicels 1-1½ in. Sepals orbicular. Petals rather larger. Stamens 12-20, forming a short capitate column; anthers opening longitudinally. Female flowers solitary and terminal on a thick peduncle. Staminodes arranged in 4 bundles. Ovary 4-8-celled. Stigma usually 8-lobed. Fruit deep-purple, globose, as large as a small orange, not furrowed, 4-8-seeded.

Grows at Máthérán, on the gháts of the Konkan, and Kánara, and is cultivated in the Mauritius, etc. This evergreen tree flowers in the cold season; Fr. in the hot season.

Wood whitish-grey, and said to be strong, but easily attacked by insects. The fruit has an agreeable acid flavour, and is eaten. The juice is used as a mordant by people who work in iron; and a delicious syrup is made of it in Goa. The expressed oil of its seed is the *kokam oil* of the natives of this country (*see* Oils). The rind dried in the sun is used in curries to give them an acid flavour.

G. cambogia, Desrouss; Bedd. Fl. Sylv. t. 85; Grah. Cat. Bby. Pl. 26. *Vilaiti amli.*

A middle-sized tree. Leaves 2-6 by ½-1½ in., oblong, elliptic or lanceolate, acuminate, attenuated at the end, coriaceous, dark-green, shining above, on a petiole ¼-½ in. long. Flowers yellow, ¾ in. diam., hermaphrodite, larger, terminal or axillary, solitary or in fascicles, sessile or pedicelled. Male flowers: pedicels ½-¾ in. long, thickened towards the tip. Sepals with narrow membranous margins, outer sepals smaller. Petals twice as long as sepals, concave. Anthers numerous (12-20 or more), adnate to a short androphore; cells dehiscing longitudinally, introrse. Female flowers: staminodia surrounding the base of the ovary in several phalanges, each consisting of 2-3 sterile stamens. Ovary 6-10-celled. Stigma 6-10, free nearly to the base. Hermaphrodite flowers: stamens 10-20; filaments unequal, all united at the base or in unequal phalanges. Fruit 2½-3 in. diam., ovate or oblong-ovoid, yellow or reddish, 6-10-furrowed; furrows with angular edges ending about the middle; the apex is flat, depressed, or nipple-shaped. Seeds 6-8, aril, succulent.

Found on the Western Gháts, from Belgaum and the Konkan to Travancore, and also in Ceylon.

This evergreen tree sometimes grows to be of considerable size in favourable places. Fl. February-March; Fr. June-July.

Wood is close-grained, of a beautiful lemon or grey colour, and is easily worked. The pigment which exudes from the trunk is yellow, semi-transparent and insoluble, hence valueless as a paint. It is, however, said to be soluble in spirits of turpentine and to form a beautiful yellow varnish. The acid rind of the ripe fruit is eaten raw, and also in curries after being dried.

G. xanthochymus, Hook.—*Xanthochymus pictorius*, Dalz. & Gibs. Bby. Fl. 31; Bedd. Fl. Sylv. t. 88. *Dampel* (Hind.). Timber Trees.

Glabrous tree, trunk straight, branches drooping, sharply angled and often enlarged immediately below the axils of leaves. Leaves 9-18 by 2-4 in., oblong-lanceolate, acute or shortly acuminate at the apex, more or less attenuated at the base, hardly coriaceous, shining green, glabrous; petiole ½-1 in. long, enlarged near the insertion on the stem. Flowers white, with a very slight tinge of yellow. Male and hermaphrodite flowers ¾ in. diam., in 4-8-flowered fascicles, from the axils of fallen leaves; pedicels ·1-1½ in., sepals small, usually 5, orbicular, concave, unequal. Petals usually 5, larger, spreading. Stamens united in 5 phalanges of 3-5, alternating with 5 glands; no ovary. Female flowers solitary in the axils of fallen leaves; ovary ovoid, 5-6-celled, crowned with a large 5-6-lobed stigma. Fruit the size of an apple, subglobose or oval, yellow. Seeds 1-4; oblong.

This beautiful evergreen tree is found on the Bombay and Madras ghâts, and all over the Eastern and Western Peninsula, Eastern Bengal and East Himalayas, Burma, Penang and the Audaman Islands. Is also cultivated in gardens.

It attains the height of 40-50 ft. and a girth of 3-5 ft. Fl. in the hot season; Fr. in the rainy season up to January.

Wood yellowish-white, becoming in time yellowish-brown, rather heavy, hard and close-grained (*see* Dyes). This tree yields a sort of gum which has no value. The fruit is full of yellow juice which resembles the gamboge of commerce. The ripe fruit is eaten by the natives.

G. ovalifolia, Hook.; Dalz. & Gibs. Bby. Fl. 31; Grah. Cat. Bby. Pl. 26. *Tawir.*

A middling-sized tree. Leaves 3½-8½ by 1¾-3½ in., rotundate, ovate, ellipticoblong or lanceolate, retuse, obtuse, or more or less acuminate, shining, on a petiole ⅛-½ in. Flowers white, ⅕-⅓ in. diam., male and female mixed; usually the female are fascicled, and the males are arranged in spikes. Male flowers: sepals usually 4, coriaceous, orbicular. Petals 4-5, concave, orbicular, twice the length of the sepals. Stamens in 5 fascicles; anthers 6-10 to each bundle. Female flowers: usually on much longer pedicles than males. Staminodes 5. Ovary round, 3-4-celled; stigma 5-lobed to the middle. Fruit broadly oval, size of a *kokam* fruit, with a smooth green rind, and full of yellow juice, 1-3-seeded.

This beautiful evergreen tree is found on the Western Ghâts, Khandála, Parr Ghát, Máthcrán (rare), and also in Ceylon.

It flowers in the cold season, and ripens its fruit in March-April. Roxburgh states that the trees cultivated in the Botanic Garden at Calcutta begin to blossom during the whole of the hot season, but does not produce perfectly ripe fruit till the month of July.

The quality of the wood is unknown. The fruit is full of yellow viscid juice, which is an inferior kind of gamboge; a tenacious gummy juice exudes also from the trunk, but it is of no value.

Ochrocarpus longifolius, Benth. & Hook.—*Calysaccion longifolium*, Dalz. & Gibs. Bby. Fl. 32; Grah. Cat. Bby. Pl. 27. *Suringi.*

A middling-sized tree, glabrous; young shoots terete, youngest slightly 4-sided. Leaves 6-8 by 2-2¾ in., opposite or ternately ver-

Timber Trees.

ticillate, oval-oblong, linear-oblong, or oblong-lanceolate, obtuse at the apex, slightly attenuated or rounded at the base, hard, thickly coriaceous, dark-green; midrib prominent, but the venation inconspicuous; petiole stout, ¼-½ in. Flowers polygamous, white streaked with orange-red, fragrant, ¾ in. diam., numerous, on slender 1-in. pedicels, arising from tubercles in the axils of fallen leaves; buds globose. Calyx rupturing into 2 valves, reflexed during flowering. Petals 4, acute, deciduous. Stamens numerous. Ovary 2-celled; ovules 2 in each cell; style short, thick, subulate; stigma large, peltate. Fruit 1 in. long, obliquely-oblong, crowned by the hard style, 1-seeded.

Very common in the Ratnágiri Collectorate, Mátherán (rare), and Konkan and Kánara gháts. It is also cultivated.

This tree sometimes grows to a large size. Fl. March-April; Fr. in the cold season.

Wood is said to be used in house-building. This tree is polygamous in a wild state, but often becomes hermaphrodite when in cultivation. Graham says that the male plant is called *wundi* and the female *poone*; both being also known under the name of *suringi* or *gardundi*. The globular buds are used for dyeing silks, and are exported to Calcutta and Europe.

Calophyllum inophillum, Linn.; Dalz. & Gibs. Bby. Fl. 31; Grah. Cat. Bby. Pl. 26. *Wundi* (Mahr.), *sultan champa* (Hind.).

Leaves 4-8 by 3-4 in., elliptic or obovate-oblong, obtuse or retuse at the apex, usually acute at the base, firmly coriaceous, glabrous, shining; on a rather strong petiole ½-1¼ in. long. Flowers about 1 in. diam., pure white, fragrant on pedicles 1-2 in., arranged in axillary, glabrous, lax, few-flowered racemes, the length of the leaves are somewhat shorter, sepals 4, the two inner petalloid. Petals 4, rarely 6-8. Stamens numerous, in 4 bundles. Ovary round, stipitate; style much longer than the stamens; stigma peltate. Fruit 1 in. diam., globular, yellow when ripe, pulpy.

This beautiful evergreen tree, sometimes called the Alexandrian laurel, is very common in Málvan and the sandy shores of Southern Konkan, Goa, Orissa, Ceylon, Eastern Peninsula and the Andaman Islands; it is also cultivated.

It attains the height of 50-60 ft. and a girth of 6-14 ft. Fl. in the cold season; Fr. in the hot season.

Wood reddish-brown, striate, rather close-grained, heavy and moderately hard. It is valuable for masts, spars, railway sleepers, and for some purposes in ship-building.

The seeds afford good lamp-oil. (*See* Oils.)

C. Wightianum, Wall. Cat.—*C. spurium*, Dalz. & Gibs. Bby. Fl. 32; Grah. Cat. Bby. Pl. 27. Called *kalpun* in Kánara.

A middling-sized tree, branches terete, young shoots square, glabrous. Leaves 2-4 by 1¼-2 in., cuneate-obovate or oblong-cuneate, obtuse or retuse at the apex, very rigidly coriaceous, shining, on petiole ⅙ in. Flowers white, ¼ in. diam., on slender pedicels, with a caducous bract at their insertion, arranged in axillary, many-flowered racemes, shorter than the leaves. Sepals 4, thin, strongly veined. Petals usually none. Ovary 1-celled, ovule one. Fruit ¾ in., oblong.

This evergreen tree is common from the Southern Konkan to Travancore.

Wood is red, very hard and heavy, and is much esteemed in Kánara, and there used for engineering purposes. (*See* Oils.) Timber Trees.

C. tomentosum, Wight; Bedd. Fl. Sylv. An. Gen. 22.—*C. angustifolium* (?); Dalz. &. Gibs. Bby. Fl. 32. *Pun, poon spar* tree.

A tall straight tree; branches 4-gonous; young shoots and panicles, rusty-tomentose. Leaves 3-5 by 1¼-2 in., elliptic or linear-lanceolate, with a bluntish accumination, rigidly coriaceous, shining, glabrous, on petiole ½-¾ in. Flowers white, about ½ in. diam., on slender pedicles, or racemes from the axils of upper leaves. Sometimes arranged into a large terminal, many-flowered panicle. Sepals 4, subrotund. Petals 4, ovate. Ovary 1-celled, 1-ovuled; stigma peltate. Drupe ovoid, pointed, about 1 in. long.

Found in moist forests of the Western Peninsula from the Konkan southwards, and in Ceylon. Both Dr. Birdwood and Colonel Beddome state that this tree is everywhere becoming scarce, and call for strict conservation. Alt. 5000 ft.

This evergreen tree grows to a large size. Fl. January-February; Fr. towards the end of the rainy season.

Wood is reddish, coarse-grained, hard, but ornamental; and is occasionally used for building purposes, chiefly for spars and masts. The seeds afford an abundant oil in Ceylon.

Mesua ferrea, Linn.; Dalz. & Gibs. Bby. Fl. 31; Grah. Cat. Bby. Pl. 26. *Nag-champa*.

Glabrous tree; trunk straight; young branches slender, obsoletely, 4-angled. Leaves very variable in size, usually 3-6 by 1½-1¾ in., linear-lanceolate or oblong-lanceolate, acute or acuminate at the apex, acute or rounded at the base, rigidly coriaceous, glabrous, dark-green and shining above, covered more or less with fine white tomentum or glaucous beneath; veins very fine, numerous, close-set, inconspicuous; petiole ¼-⅓ in. Flowers large, ¾-3 in. diam., pure white, fragrant (the fragrance partaking of rose and violet), usually terminal, and solitary or in pairs. Sepals 4, rotundate, fleshy, velvety with membranous margins, inner pair largest. Petals 4, spreading, broadly obovate. Stamens numerous, free or connate at the base. Anthers large, golden-yellow, 2-celled, dehiscing vertically. Ovary 2-celled, with 2 erect ovules in each cell. Style long, with a peltate stigma. Drupe of a variable size, often the size of a pigeon's egg, ovate, acuminate, striate, the base surrounded by the persistent sepals. Seeds 1, rarely 2-4, dark-brown, smooth.

In this Presidency it is to be found in Southern Konkan, Vádi, Goa, Belgaum, and all over India, Burma.

This beautiful evergreen tree is of a middling size, but sometimes attains the height of 50-60 ft. and a girth of 6-7 ft. It is also cultivated on account of its flowers, which appear February-March; Fr. May-June.

Wood reddish-brown; the sap-wood of a lighter colour, close-grained, very heavy, hard and difficult to work; but very durable under water; suitable for machinery, railway sleepers, gun-sticks, etc.

TERNSTRÖMIACEÆ.

This order is represented in this Presidency by two small trees :—

Eurya japonica, Thumb.; Brand. For. Fl. 24. *Baunra, gonta, deura.*

Timber Trees.

A tall glabrous shrub or small tree; branchlets angular. Leaves 2-5 by 1-1½ in., alternate, oblong-lanceolate to elliptic-lanceolate, acuminate at both ends, obtusely serrate, coriaceous, hairy when young, on a short, thick petiole. Flowers diœcious, small, white, on short glabrous-drooping pedicels, solitary or in fascicles, axillary or from the axils of fallen haves. Sepals and petals 5, much imbricate, the latter connate at the base. Stamens 12-15, inserted at the base of the corolla in a single series. Anthers adnate, opening longitudinally. Ovary ovoid, usually 3-celled; ovules several in each cell. Styles 3, rarely 4-5; slender, distinct or united at the base. Fruit globular, smooth, ⅙ in. diam., crowned by the persistent base of the style.

This tree resembles much the tea plant in leaf and general appearance. In this Presidency it is found in the forests of the Southern Konkan, and is widely spread over the mountainous parts of the Eastern and Western Peninsula, Ceylon and the Himalayas. Alt. 3500-9000 ft.

This evergreen tree attains the height of 15-25 ft. and a girth of 1-1½ ft. Fl. March-June; Fr. in the rainy season.

Wood is of a light pinkish-brown colour.

Gordonia obtusa, Wall.; Bedd. Fl. Sylv. t. 88. *Najetta* in the Nilghiries.

A middling-sized glabrous tree. Leaves 2-4 by 1-1½ in., narrow-elliptic or lanceolate, obtuse or with a blunt acumination, tapering at the base, crenate, glabrous, short-petioled. Flowers 1½ in. diam., white, solitary, on peduncles a little shorter than the petioles. Sepals generally 5, orbicular, silky-pubescent externally. Petals generally 5, obcordate, slightly united at the base, slightly silky-pubescent on the outside. Stamens numerous, somewhat pentadelphous. Anthers versatile. Ovary 3-, usually 5-celled. Style single; stigma large. Capsule 1 in. long, 5-angled. Seeds flattish, oblique.

This beautiful evergreen tree is found on the mountains of the Western Peninsula from the Konkan to the Pulney Hills. Alt. 2500-7500 ft.

Wood yellowish-white and even-grained, easy to work; generally used for planks, rafters and beams; but liable to warp.

DIPTEROCARPÆ.

Hopea Wightiana, Wall.; Bedd. Fl. Sylv. t. 96.; Wight's Illustr. t. 37. *Kalbow, kong, hiralbogi* in Kánara.

A tall tree; branchlets pale, when young covered with a dense soft pubescence. Leaves 5-9 by 2-3½ in., ovate-oblong or lanceolate, obtuse or acute at the apex; acute, rounded or emarginate at the base, glabrous; nerves oblique, rather prominent above; petiole ¼-½ in., pubescent. Flowers pink, about ⅜ in. diam., secund, with a bract at the base of pedicels, arranged in racemose, axillary panicles 1-6, usually 3 together, shorter than or about the length of the leaves. Calyx glabrous, segments lanceolate, obtuse.

Petals hairy externally. Stamens about 15; anthers terminated with a bristle, about 4 times their length. Ovary, 3-celled, each cell 2-ovuled. Style subulate. Fruit ⅓ in. long, ovoid. Calyx wings 1⅜-2½ in. long, 7-9-nerved, crimson-coloured.

This tree is found in the forests of the Southern Konkan and Madras.

Wood is hard, heavy and durable, and is serviceable for railway sleepers and carriages. It is much used by the natives of South Kánara, for temple-building. — Timber Trees.

The inflorescence is often diseased and converted into a globular achinate mass resembling Spanish chestnut.

Vateria Indica is said to grow in the Southern Konkan; but this statement requires confirmation. *See* Grah. Cat. Bby. Pl. 22.

MALVACEÆ.

This order, to which the cotton plant belongs, contains numerous fibrous plants, but a few unimportant timber trees.

Hibiscus tiliaceus, Linn.—*Paritium tiliaceum*, Dalz. & Gibs. Bby. Fl. 17; Grah. Cat. Bby. Pl. 14. *Belli-pata.*

A much-branched tree; young parts densely tomentose. Leaves 4-6 by 4-5 in., roundish, cordate-ovate or broadly cordate, shortly and abruptly acuminate, entire, crenulate, rarely lobed, long-petioled, leathery, glabrous above, hoary-tomentose and sometimes glandular beneath, 7-nerved. Stipules foliaceous, broadly-oblong, deciduous. Flowers large, yellow, with a dark crimson eye. Peduncles short, woody, terminal, with stipule-like deciduous bracts at the base. Bracteoles (epicalyx) 7-14, linear-lanceolate, connate above the middle, shorter or about the length of the calyx. Calyx 1 in., broadly-campanulate, 5-partite; divisions lanceolate, pubescent externally. Corolla 2-3 times the size of the calyx, campanulate. Staminal tube 1½ in. Ovary 5-celled. Styles 5, connate at the base; stigma capitate. Capsule shorter than the calyx, oblong, acuminate, pentagonal, densely hairy, 5-valved, spuriously 10-celled. Seeds slightly pilose.

Found along the coast of the Indian Peninsula. In this Presidency it grows at Ratnágiri, Vádi and on the banks of the Tiracol River; Ceylon, Chittagong and Tenasserim. It is also cultivated.

This evergreen tree becomes sometimes very crooked and stunted, but attains the height of 25-30 ft. and a girth of 2-3 ft. It flowers all the year round.

Wood is soft and valueless, except as fuel. The bark abounds in mucilage, and is said to be sucked in times of famine in the West Indies. The liber yields strong fibre. (*See* Fibres.)

Thespesia populnea, Correa; Dalz. & Gibs. Bby. Fl. 18; Grah. Cat. Bby. Pl. 15. *Bhendi, parsipū.*

All young parts covered with small rusty peltate scales. Leaves 3-5 by about 3 in., cordate, ovate, acute, acuminate or almost cuspidate, leathery, entire, glabrous, 5-7-nerved, with a glandular pore beneath between the nerves; petiole long, usually 2½ in. Stipules falcate. Flowers large, pale, sulphur-coloured, turning reddish, on axillary, slender peduncles. Bracteoles (epicalyx) 5, oblong, lanceolate, deciduous, as long as the bell-shaped, 5-toothed calyx. Corolla 2-3 in. diam. Staminal tube 5-toothed at the apex. Ovary 5-celled. Style club-shaped, 5-furrowed. Capsule 1½ in., coriaceous, globose, somewhat depressed, sprinkled with minute scales ultimately glabrescent, 5-celled, indehiscent or opening slightly on the top. Seeds 2 in each cell, large, shortly tomentose or pilose.

Timber Trees.

Grows wild all over India, and is often planted as shade trees. Found also in Ceylon, Chittagong, and Tenasserim, etc.

This evergreen tree attains sometimes the height of 30-35 ft. and a girth of 3-4 ft. It flowers all the year round.

Wood pale reddish-brown, fading to pale-reddish, strong, durable, straight, even-grained and hard. Good for furniture, carpentry, etc.; used for panels of carriages, cart-framing, naves, etc. The bark yields fibre. The yellow viscid juice of the capsule is used by dyers, and also in scabies and other cutaneous diseases, the affected part being at the same time washed daily with a decoction of the bark of the tree.

Kydia calycina, Roxb.; Dalz. & Gibs. Bby. Fl. 24; Brand. For. Fl. 29. *Warang* or *warungud, bhoti, pola, puli, potari.*

All young parts and inflorescence more or less stellate-tomentose or velvety. Leaves 4-5 by 3-4 in., cordate, roundish or ovate-obtuse, acute or acuminate, palmately 5-7-nerved at the base, more or less deeply lobed, middle lobe longest, dark-coloured above, pale and velvety beneath. Petiole 1-2 in. Flowers polygamous, white, pink, or sometimes pale-yellow, in axillary and terminal panicles. Bractooles 4-6, nearly as long as the calyx, ultimately enlarging. Calyx campanulate, 5-lobed and persistent. Petals 5, obcordate, oblique, longer than the calyx. Stamens monodelphous, the tube divided to about the middle into 5 bundles, each bearing 3-8 reniform anthers. Ovary 3-celled. Style 3-cleft; stigma peltate. Capsule globose, 3-valved, opening loculicidally. Seeds reniform, furrowed, stellately pubescent.

Common throughout our ghâts, Sávantvádi, Goa and the tropical regions of the Himalayas, Oude, Central Provinces, Bengal and Burma.

It attains the height of 25-40 ft. and a girth of 3-4 ft. Fl. July-October, sometimes further on; Fr. in the cold season, continuing to the hot season. It sheds its leaves in February; the new foliage appears in April-May.

Wood white, soft, straight-grained; used for house-building, ploughs and for carving. The liber yields fibre of which a strong coarse cordage is made in Garhwal. It is said that in Northern India the bark is used for the clarification of sugar.

Adansonia digitata, Linn.; Dalz. & Gibs. Bby. Fl. Suppl. 9; Brand. For. Fl. 30. *Gonik chintz, gorak amla, baobab, monkey bread tree.*

Trunk of an immense size, close to the ground, but soon tapering and resembling a cone. Leaves digitate, glabrous, pubescent beneath when young, deciduous; leaflets generally 5-7, 3-4 in. long, obovate or oblong-lanceolate, acuminate, attenuated at the base, entire or sinuous at the margins. Flowers white, solitary, axillary, pendulous, long-peduncled (often more than 12 in). Bracteoles 2. Calyx thick, coriaceous, fleshy, cup-shaped, 5-cleft, tomentose externally and clodded with silky hairs internally. Petals obovate, adnate below to the stamens. Staminal tube thick, dividing above into numerous filaments; anthers long, linear, reniform or contorted, 1-celled. Ovary ovoid. Style long, filiform, divided at the summit into as many radiating stigmas as there are cells to the ovary. Fruit pendulous, oblong, downy, woody, indehiscent, 8-12 in. long. Seeds kidney-shaped, brown, immersed in a mealy, slightly acid substance.

Native of Africa, and cultivated all over India, along the coast of Gujarát, Central Provinces, Bengal, etc., Ceylon.

This quaint-looking tree, remarkable for its disproportionately large, short trunk, attains sometimes the height of 60-70 ft. Fl. May-June; it sheds its leaves in the dry season; the new ones appear April-June. Timber Tree

Wood is pale-coloured, soft and porous. It is often used as rafts to support fishermen in tanks, and the long dry fruit as floats for fishing nets. It appears that the reddish, mealy, acid pulp surrounding the seeds is refrigerent and diuretic, and is employed as a remedy in dysentery. The leaves, dried and powdered, are eaten mixed with food, and is said to restrain excessive perspiration. The bark has been proposed as a substitute for quinine; its liber affords excellent fibre. (*See* Fbres.)

Bombax malabaricum, D. C.; Brand. For. Fl. 31; *Salmalia malabarica,* Dalz. & Gibs. Bby. Fl. 22. *Saur, saer, somr, semul, shembal, silk-cotton tree.*

A glabrous tree covered with hard conical prickles, ½ in., with black points; branches spreading. Leaves digitate, deciduous, 5-7 foliolate; leaflets generally 4-8 in. long, elliptic-oblong to oblong-lanceolate, acuminate or cuspidate at the apex, narrow at the base, glabrous, entire; common petiole as long as or longer than the leaflets; petiolules slender, about 1 in. Flowers numerous, large, scarlet or occasionally white, on short pedicels, fascicled near the ends of branches. Bracteoles 0. Calyx 1 in. long, cup-shaped, thick, coriaceous, irregularly cleft into short, obtuse 3-4 lobes, smooth externally, silk-hairy within. Petals 5, oblong, fleshy, recurved, tomentose externally, pubescent or nearly glabrous inside. Staminal tube shorter than the filaments; the latter thick and shorter than the petals, multi-seriate; 5 innermost divided at the top, each bearing an anther; 10 intermediate ones simple and shorter; the outer numerous and are united into 5 clusters. Anthers reniform, contorted, 1-celled. Ovary 5-celled, with several ovules in each cell. Style clavate; stigmas 5. Capsule 6-7 in., oblong, blunt, obsoletely 5-angled, woody, 5-valved. Seeds numerous, obovate, smooth, enveloped in silky fine wool.

It is common in the Bombay Presidency, in the Konkan, Southern Marátha Country and in Gujarát; and all over India, Burma and Ceylon. Alt. 3000 ft. and cultivated as high as 6000 ft.

This tree attains the height of 60-90 ft. and a girth of 12-15 ft., in favourable circumstances much more. The trunk is straight and its corky bark of a grey ash colour, often marked with cracks. Fl. February-March; Fr. April-May. Sheds its leaves in November and continues leafless till April.

Wood very light, white or yellowish-white when fresh cut, becoming darker on exposure, coarse-grained, brittle, perishable, durable only under water, takes no polish. Used for coffins, packing cases, toys, scabbard, planking, fishing floats, and is said to be often rafted with heavier timber to make it float. Canoes are also made of it in Burma. From the bark exudes a gummy juice, which has been thought erroneously to be *mochras* or *mucherus,* held in high esteem as a demulcent and astringent. It yields gallic and tannic acids, and occurs in more or less large, inodorous, opaque, dark-brown pieces, some of which present such a resemblance to galls, that they are called by some people *supari-ka-phal (areca nuts).* The botanical source of *mucherus* is unknown.

There are sold in the bázár under the name of *safed musli,* small, shrivelled rootlets, highly esteemed as useful in general debility and wasting diseases. They are white or buff-coloured, destitute of taste or odour, 1 or 2 in. long, and of the thickness of a quill. The source of

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this drug was doubtful; it was supposed by some to be derived from the roots of *Saur* and by others from those of *Curculigo orchioides*. Mr. Mohideen Shereef, of Madras, has positively stated that the bulbous rootlets of *Asparagus adscendens* are the source of *safed musli*.

The wool covering the seeds is used in stuffing pillows. The calyx of the flower-bud is eaten as vegetable.

Eriodendron anfractuosum, D. C.; Dalz. & Gibs. Bby. Fl. 22; Grah. Cat. Bby. Pl. 17. *Shamcula, safed simal.*

Trunk straight, armed when young with conical woody prickles, branches spreading horizontally, verticillate, usually ternary, all parts glabrous. Leaves 5-8 foliolate, on petioles as long as or longer than the leaflets; leaflets 3-4 by 1 in., lanceolate, acuminate or cuspidate with a mucro, entire or serrulate towards the point, glaucescent beneath, shortly petioluled or almost sessile. Stipules small, caducous. Flowers appearing before the leaves, of a dingy white colour on peduncles about 2 in., fascicled, axillary or terminal, 1-flowered, drooping. Calyx thick, coriaceous, 5-lobed; lobes roundish, glabrous externally, downy within. Petals 5, 1 in., oblong, connate at the base, thick, tomentose outside. Staminal bundles 5, united at the base, each bearing 2-3 variously convolute, linear, 1-celled anthers. Ovary ovoid, 5-celled, with several ovules in each cell; style thick; stigma entire or 5-lobed. Capsule oblong, thick, coriaceous, 5-valved. Seeds numerous, black, imbedded in a silky wool.

Found throughout the hotter forests of India and Ceylon, and is planted near villages and temples; also found in Pegu and Tenasserim.

This tree grows to a large size in Khándesh, attaining sometimes the height of 60-80 ft. and a girth of 10-12 ft. Fl. February-March; Fr. April-May; sheds its leaves in the cold season, and continues leafless till the hot season.

Wood is light and soft, good for toys. The cotton of the seeds is said to be used for the same purposes as that of *bombax*.

STERCULIACEÆ.

The ovary of Sterculias consists of 4-5 free or nearly free, sessile or stalked carpels. No corolla. This order yields several timber trees.

Sterculia fœtida, Linn.; Dalz. & Gibs. Bby. Fl. Suppl. 10; Grah. Cat. Bby. Pl. 18. *Jungli-baddam, kuo-mhad* and *virhoi* (Goa), *bastard-poon tree.*

A straight stout tree, glabrous, except the very young leaves and shoots; branches horizontal, verticillate. Leaves crowded at the ends of the thick branchlets, on petioles 8 in.; digitately 5-9 (11)-foliolate; leaflets about 6 by 2 in., elliptic-oblong or lanceolate, acuminate or cuspidate, entire, shortly petioluled, coriaceous. Stipules ensiform, caducous. Flowers polygamous, of a dull crimson colour, rather large, emitting a strong disagreeable smell; in lax, simple or branched racemes about as long as the petioles; pedicels shorter than the flower, jointed in the middle. Bracteoles minute. Calyx ½-1 in. diam., campanulate, deeply 5-cleft, glabrous externally and hairy internally; lobes lanceolate, spreading. Petals none. Staminal column bearing several (12-15) sessile, 2-celled anthers. Carpels 5,

with many ovules in each, villous. Style stalked, curved. Follicles about 2-4 by 2½ in., glabrous, woody, boat-shaped, shortly beaked. Seeds 10-15, large, oblong, black, smooth. Timber Trees.

Common in Bombay, generally cultivated throughout India, found sparingly in a wild state throughout the Bombay, Madras and Bengal Presidencies : also in Ceylon and Burma.

This handsome stately tree attains the height of 80-90 ft. and a girth of 8-10 ft. Fl. March-May; Fr. beginning of the rainy season; sheds its leaves in the hot season.

Wood very light, tough, coarsely fibrous, loose-grained, white, turning yellowish, easily worked, takes an indifferent polish. Used for house-building, and the construction of masts and canoes; good for making packing cases, etc. The seeds are roasted and eaten like chestnuts. The liber yields fibre. (*See* Fibres.)

S. urens, Roxb.; Dalz. & Gibs. Bby. Fl. 23; Brand. For. Fl. 33. *Kavali, kandol, gwira, karai, gulu, kulu, gular.*

Trunk erect; branches spreading, marked with large scars; the softer parts tomentose. Leaves crowded at the ends of branches, 9-12 in. long and broad, cordate at the base, usually 5-lobed; lobes entire, acuminate, membranous or somewhat coriaceous, tomentose beneath, nearly glabrous above; petioles 6-9 in. Stipules caducous. Flowers small, numerous, greenish-yellow, covered with a glutinous yellow tomentum; male and female mixed, in much-branched panicles; pedicels furnished at their bases with linear bracts, deciduous after flowering. Calyx ¼ in. diam., 5-toothed. Corolla none. Filaments 10, alternately longer, united below into a thin sheath, which encloses the base of the gynophore. Anthers large, alternately larger. Ovary supported on a thick gynophore. Style short and thick; stigma 5-lobed. Fruit of 5-radiating carpels, 3 in. long, orange to bright red, covered with dense tomentum, intermixed with stiff hairs, stinging like those of *cowitch (mucuna)*. Seeds 3-6, oblong, black or chestnut coloured.

In our Presidency it is very common in the Konkan. Found all over India, Ceylon, Assam, Pegu and Tenasserim.

A large tree attaining the height of 60-70 ft. and a girth of 8-10 ft. The trunk short, often crooked and irregular. It has a greyish-white bark; the outer part papery, the inner fibrous. Fl. December-March; Fr. April-May. Leafless during the cold season; the young leaves appearing in the hot season.

Wood white, with a reddish-brown centre, emitting an unpleasant smell, soft, spongy and loose-grained; used for fuel, toys, etc. Native guitars are made of it. The trunk yields a gum resembling tragacanth, sold in the bázár under the name of *katila* or *katira*, with the gum of *S. villosa* and *Cochlospermum* and some other trees. The seeds are roasted and eaten, and said to be cathartic in their effects. A kind of coffee is made of them. (*See* Oils and Fibres.)

S. villosa, Roxb.; Dalz. & Gibs. Bby. Fl. 22; Brand. For. Fl. 32. *Gulkhandhar, anni-nar, udal, udar.*

Branches few, spreading, with large scars; younger parts tomentose. Leaves 12-18 in. each way, crowded at the ends of branches, deeply palmately 5-7-lobed, cordate at the base, 5-7-nerved; lobes oblong, acute or acuminate, sometimes 3-fid, nearly glabrous or

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thinly stellate-pilose above, tomentose beneath; petioles puberulous, as long as the leaf, enlarged at the top; stipules oblong, acuminate. Flowers numerous, male and female mixed, yellow, sometimes with pink or orange eye, on slender pubescent pedicels, nearly as long as the calyx, arranged in lax, drooping panicles, about 12-14 in., tawny-pubescent, at the ends of the leafless branches. Bracts linear caducous. Calyx ½ in. diam., membranous, campanulate, deeply 5-cleft, lobes spreading, puberulous externally. Corolla none. Anthers 10, on the top of the staminal column. Ovary globose, puberulous on a gynophore as long as the calyx. Style curved. Fruit consisting of 5, coriaceous, oblong, rusty, densely tomentose follicles, about 1½-3 in., almost sessile. Seeds oblong, black, several in each carpel.

It is found all over India, and in this Presidency from Gujarát to Southern Konkan. In Bengal, North-West India, the Himalayas, Kumaon and Burma. Alt. 3500 ft.

In Southern India this tree sometimes attains the height of 60-70 ft. and a girth of about 4-6 ft: but towards the north it has a stunted growth, and is seen only as a shrub 8-10 ft. high. Fl. March-April; Fr. June-July. Leafless during the cold season; new leaves appear March-April.

Wood reddish, central part grey; soft, light, and fibrous, but valueless. A pellucid gum (also called *katira*) exudes from the trunk and is sold as a substitute for tragacanth, but not so valuable. The liber yields a coarse, strong fibre, which is made into ropes and coarse canvas for bags in Goa and Kánara. These ropes are used for dragging timber by elephants and buffaloes. A good kind of paper is said to have been made from the fibre.

S. guttata, Roxb.; Dalz. & Gibs. Bby. Fl. 23; Grah. Cat. Bby. Pl. 17. *Kukar, goldar.*

A large erect tree; young shoots pubescent. Leaves 7-8 by 4-5 in., smooth, shining or scabrid above, beneath very softly villous, oblong-ovate, acute or suddenly acuminate, rounded or slightly cordate at the base, entire; petiole round, downy, 2-4 in. Stipules very caducous. Bracts lanceolate. Flowers chiefly hermaphrodite, usually in threes on pedicels shorter than flowers in terminal and axillary, villous racemes. Calyx ⅓ in., 5-fid; segments broadly ovate-acute, reflexed, densely villous on both sides, of a pale-yellow colour externally, internally of the same colour spotted with purple. Corolla none. Anthers 12. Ovary long-stalked, 3-5 lobed, downy. Style curved; stigma 3-5 lobed. Follicles 1-5, usually 5, each about 3 by 2 in., obovoid, villous, of a brilliant red colour. Seeds large, oblong, black.

Common along the coast, Konkan, Malabár, Nilghiries, Madras, Ceylon, Andaman Islands and Malacca.

It is a large tree with an ash-coloured cracked bark, and looks very ornamental, especially when covered with red follicles. Fl. generally in February, when the tree is leafless; Fr. in the hot season.

The character of its wood is not known, nor is it much used. The inner bark yields fibres from which cordage is made. Cloth is also manufactured from them in Malabár. The seeds are roasted and eaten. (*See* Fibres and Oils.)

S. balanghas, Linn.; Grah. Cat. Bby. Pl. 17; Bedd. Fl. Sylv. An. Gen. 32. *Kavalum* in Malabár.

A middling-sized tree, young parts rusty tomentose. Leaves crowded about the extremities of the branchlets, 5-6 by 3 in., ovate-oblong, elliptic-oblong or lanceolate, obtuse or acuminate at the apex, rounded at the base, entire, glabrous above, pubescent beneath, or glabrous on both sides by age. Petioles 1½-2 in. Stipules subulate. Flowers numerous, small, drooping, hoary-tomentose outside, red within, fragrant, on about ½ in., villous pedicels, arranged in hairy, axillary, pendulous panicles. Calyx campanulate, about ½ in. diam., 5-cleft; segments long, slender, margins revolute, connivent at the points; in hermaphrodite flowers; anthers numerous, small, surrounding the base of the ovary. Carpels very hairy. Stigmas curved, as long as the style. Follicles 3 in., oblong acuminate, rusty tomentose. Seeds black. **Timber Trees.**

This tree is found in the Thána District and in the Konkan forests and in various parts of India and in Ceylon; it is often cultivated in gardens. Fl. April-May; Fr. in the rainy season.

Wood is soft and open-grained. Its use is not known. The bark is of a brown colour and pretty smooth. The seeds are roasted and eaten, and the capsules burnt in Amboyna for the preparation of the colouring matter, called by the natives *kussumbha*.

S. colorata, Roxb.; Dalz. & Gibs. Bby. Fl. 23.; Brand. For. Fl. 34. *Khowsey, bhai-koi, bodula, samarri, walena.*

Branches spreading; young parts pubescent. Leaves 6-9 by 5-12 in., alternate, crowded at the ends of branches, palmately 5-lobed, cordate at the base; lobes acuminate; common petiole, 4-9 in. Stipule erect, lanceolate. Flowers numerous, deep orange-red, showy, on short pedicels, arranged in terminal, numerous, erect, panicles. Calyx ¾-1 in., cylindrical-clavate, leathery, 5-lobed; lobes obtuse, covered with brilliant red, stellate-pubescence. Corolla none. Anthers about 30, sessile, round the border of the apex of the column. Carpels 5, oval. Styles 5, short, curved. Stigma acute. Follicles 1-5, 2-3 in. long, stalked, oblong-lanceolate, glabrous, membranous, opening long before the seeds are ripe, pink outside, and yellowish inside. Seeds ovoid, generally 2, about the size of a large pea, adhering one to each margin of the carpel near its base.

It is found in the forests throughout the Konkan and in the Deccan above the ghâts, as well as in Bengal, Oude, valleys of the Himalayas and various other parts of India, Ceylon and Burma. Alt. 4000 ft.

This tree, which has an ash-coloured and scabrous bark, attains the height of 50-60 ft. and a girth of 5-6 ft. Fl. March-April, when it is the most beautiful object to be seen, appearing as if ornamented with red coral; Fr. June-July. Sheds its leaves in the cold season; new leaves appearing with or soon after the flowers.

Wood of a dingy white colour, very soft, marked with conspicuous medullary rays. The bark yields fibre of an inferior kind, and not so strong as that of *S. villosa.* Twigs and leaves are used as cattle fodder. (*See* Fibres.)

Heritiera littoralis, Dryand.; Dalz. & Gibs. Bby. Fl. 22; Grah. Cat. Bby. Pl. 18. *Sundri.*

All young parts silvery-scaly. Leaves 5-8 by 2-4 in., alternate, oblong-lanceolate or ovate, rounded or subcordate at the base, entire, coriaceous, glabrous above, densely silvery lepidote beneath. Petiole ½-1 in. Stipules lanceolate, caducous. Flowers monœcious,

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red, small, numerous, in loose-tomentose panicles, in the upper axils or above the scars of the fallen leaves. Calyx about ¼ in., campanulate, urceolate, 5-toothed. Corolla 0. Staminal column in the male slender, bearing below the summit a ring of 5 anthers, with 2 parallel cells. Carpels 5 nearly distinct; 1 ovulate. Style short; stigmas 5. Fruit-carpel sessile, ovoid, woody, indehiscent, smooth or turbercled, brown, 1-4 in. long, with a slight projecting inner edge and a strong almost winged keel along the outer edge.

Along the sea-coast throughout India, Ceylon and Burma extending as far as the Khasia Hills in Cachar; also in Australia and Africa.

This evergreen tree attains the height of 20-30 ft., sometimes more, and a girth of 4-5 ft. It has a greyish bark. Fl. April-May; Fr. towards the end of the hot season.

Wood of a light-red colour turning to brown, rather light but strong, fibrous, somewhat loose-grained and not very durable nor easily worked. Used for poles and shafts of carriages, spokes of wheels, boxes, packing cases, etc.; also used as firewood.

Kleinhovia hospita, Linn.; Dalz. & Gibs. Bby. Fl. 23; Grah. Cat. Bby. Pl. 18.

A small tree; trunk straight with smooth bark. Leaves 6-12 by 2-3 in., alternate, broad-cordate or ovate, acuminate, entire, thin-membranous and smooth on both sides, 3-5 nerved. Petiole almost as long as the blade. Stipules ensiform. Flowers pink or rose-coloured, slightly fragrant, numerous, arranged in large, terminal, cymose panicles. Bracteoles ensiform. Pedicels downy, jointed. Calyx 5-partite, deciduous; segments lanceolate, villous, nearly equal, longer than corolla. Petals 5, unequal; the upper with longer claws; margins involute; lateral pair oblong, concave, and pressing on the staminal column; lower pair also oblong, but larger. Staminal column expanded above into a bell-shaped, 5-cleft cup; each division with 3 anthers, with cells diverging, and one short staminode between each division. Ovary ovate, villous, inserted on the cup of the column, 5-lobed, 5-celled. Styles slender; stigma 5-partite. Capsule inflated, membranous, pyriform, turbinate, 5-lobed, loculicidally 5-valved. Seeds 1-2 in each cell, small, round, tubercled.

Grows in Southern Konkan, Madras, Ceylon, Malacca, Singapore, Java and the Philippines. It is also cultivated at Poona and elsewhere. Believed to have been introduced into India in 1798 from the Moluccas.

This handsome tree sometimes grows to be of large size. Fl. towards the end of rainy season; Fr. October-November.

Quality of the wood is not known. It is stated that the old wood is highly valued in Java for various purposes.

Pterospermum suberifolium, Lam.; Dalz. & Gibs. Bby. Fl. 24; Grah. Cat. Bby. Pl. 19. *Muchunda.*

A middling-sized tree; trunk straight. Leaves 2-6 by 1-2 in., cuneate-oblong, shortly-acuminate, coarsely-toothed or somewhat lobed at the apex, obliquely cordate or subcordate, 5-9-nerved at the base, coriaceous, covered when young with a rusty tomentum, becoming soon glabrous above, and very white-pubescent beneath. Petioles about ½ in. Bracteoles very caducous. Peduncles axillary, twice as long as the petiole, 1-3-flowered. Flowers about 1¼ in.

diam., light-yellow, fragrant. Sepals 5, slightly united at the base, oblong linear, revolute, covered with ferruginous tomentum on the outside. Petals 5, linear-oblong, obtuse, equalling the sepals. Staminal column short, divided at the top into 5 linear staminodes, with 3 stipitate anthers between each; anther-cell linear parallel. Ovary with 4 ovules in each cell. Capsule 1-2 in., obovoid, obsoletely angular, 4-5-valved, covered with furfuraceous pubescence. Seeds 2-4 in each cell, usually 2, obliquely oval, compressed, surmounted by small, thin-membranous wing. Timber Trees.

Native of the forests of the Konkan and Madras; found also in Ceylon and Ava. Cultivated on account of its fragrant flowers.

Fl. in the hot season; Fr. in the rainy season.

Wood close-grained, tough, moderately hard, pinkish-brown; used for buildings, poles of bullock-carts, gun-stocks and various other purposes.

P. acerifolium, Willd.; Grah. Cat. Bby. Pl. 20; Brand. For., Fl. 35. *Karnikara, kanak-champa.*

All younger parts tawny-tomentose. Leaves 10-14 by 6-12 in., simple or lobed, ovate-oblong, or obovate-oblong, peltate or cordate at the base, 7-12 nerved, entire or coarsely toothed, covered on the upper side with stellate-pubescence when young, at length glabrous above, and grey tomentose beneath, coriaceous. Petiole round, striated. Stipules many-cleft, caducous. Flowers 5-6 in. diam., white, fragrant, with many-cleft bracteoles. Peduncles axillary, 1-3 flowered, very short. Sepals 5, linear-oblong, revolute, thick coriaceous, rusty tomentose outside, villous within. Petals 5, linear-oblong or obliquely cuneate. Staminodes club-shaped. Ovary oblong, rusty-tomentose, 5-angled, 5-celled; cells many-ovuled. Capsule 4-6 in., woody, 5-angled, 5-celled, 5-valved, covered with a dark-brown, scurfy tomentum. Seeds numerous, ovoid, compressed, smooth, with large, thin-membranous wings.

Cultivated throughout India, and is found wild at Máhím, in the Konkan and in some parts of Madras, Bengal, Kumaon, the Himalayas and Burma. Alt. 4000 ft.

This handsome evergreen tree sometimes attains the height of 40-50 ft. and a girth of 3-4 ft. Fl. in the hot season; Fr. in the cold season.

Wood is of a light-red or brown colour, coarsely fibrous, moderately hard, heavy, and takes a fine polish; good for furniture. Leaves are used as plates and for packing tobacco; the down is used to stop bleeding.

P. heyneanum, Wall.; *P. Lawianum*, Dalz. and Gibs. Bby. Fl. 24; Grah. Cat. Bby. Pl. 246. *Muchunda?*

A middling-sized tree; with the trunk tolerably straight; young parts covered with stellate-rusty pubescence. Leaves 4-6 by 2-3½ in., alternate, oblong-acuminate; repand-toothed, or rarely lobed at the apex, subcordate, cuneate, rarely subpeltate, 5-nerved at the base, coriaceous, glabrous when adult on the upper side, white-tomentose beneath, with prominent nerves. Petiole ½ in. tawny-tomentose. Stipules deciduous, ensiform. Flowers large, white, fragrant. Bracteoles persistent, deeply divided. Peduncles shorter than the petioles, axillary. Sepals 5, linear, revolute, 2 in. Petals 5, obliquely-obovate, spreading. Staminodes linear. Ovary oblong, villous, 5-celled; ovules numerous. Capsule 2 in. long, acute,

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obscurely 5-angled, woody, covered with furfuraceous pubescence. Seeds 8 in each cell, produced into a membranous, acute wing.

The whole of this tree is of a pale-tawny colour, and is found in Dhárwár and the southern ghâts, extending to all the forests of India.

Fl. in the hot season; Fr. in the rainy season.

The wood is white, and too soft to be of any use.

P. glabrescens, W. & A. Prod.; Grah. Cat. Bby. Pl. 20; Bedd. Fl. Sylv. An. Gen. 34. *Solda* in Port.

A middling-sized tree. Leaves 6 by 3½ in., cordate, or cuneate-obovate, shortly and suddenly acuminate; equal and 5-nerved at the base, entire, coriaceous, glabrous above, ashy-pubescent beneath, with rusty-pilose, prominent nerves. Petioles about ½ in. Stipules linear, entire, ½ the length of the petiole, persistent. Flowers white changing to yellow, 4 in. diam., on axillary peduncles about ½ in. Sepals 5, linear-oblong, hairy within, 5 or 5¼ in. long. Petals 5, oblong, thick, nearly as long as the sepals, glabrous within, and villous externally. Staminal column long, about 1 in. Staminodes linear. Ovary ovoid, obscurely furrowed. Capsule woody, 5-6 in., stipitate, 5-angled, pointed, covered with yellow tomentum, glabrous by age. Cells 10-12-seeded.

This very handsome tree is found in the Southern Konkan and in the forests of Madras.

It is an evergreen tree; Fl. March; Fr. beginning of the rainy season.

Quality of the wood requires an examination.

Eriolæna Hookeriana, W. & A. Prod.; Grah. Cat. Bby. Pl. 20; Brand. For. Fl. 36. *Bute* or *bother, botku, arang.*

A middling-sized tree; young parts stellate-downy. Leaves 4 in. each way, roundish-cordate, shortly-acuminate, serrate, thinly stellate-hairy, at length glabrous above, rusty-stellate-pubescent beneath. Petiole nearly ½ the length of the leaf. Stipules linear, caducous. Flowers 2 in. diam., yellow on peduncle as long as or longer than the petiole, stellate-pubescent, at length glabrous, axillary, 3-flowered. Bracteoles deeply cut into numerous linear segments, pubescent, deciduous before the flower expands. Sepals 5, lanceolate, densely pubescent externally, silky within. Petals 5, shorter than sepals, with a broad tomentose claw. Staminal column short, bearing numerous, linear-oblong anthers in many series. Ovary sessile, 7-10-celled, ovoid. Style densely pubescent. Stigma 8-10-lobed. Capsule 1 in. long, ovoid, woody, 10-valved; valves hairy, tubercled or pitted. Seeds numerous with a tapering wing above.

Mahábaleshvar in ravines, in the forests of the Konkan, Nilghiries and Behár. Alt. 1-4000 ft.

Fl. March-May, when the tree is almost destitute of leaves; Fr. September-November.

Wood reddish, strong, hard, and polishes well. The liber yields excellent fibre.

E. Candollei, Wall.; Dalz. & Gibs. Bby. Fl. 24. *Bute?*

Young parts stellate-tomentose. Leaves 5-7 by 4 in., ovate cordate, acuminate, irregularly crenate-toothed, palmately 5-

nerved, nerves prominent on the under surface, stellato-tomentose or glabrescent above, grey or white pubescent beneath. Petiole 1½-3 in., tomentose or glabrescent. Stipules lanceolate, small, deciduous. Flowers 1½ in. diam., yellow, numerous, in terminal and axillary racemes, nearly as long or longer than the leaves. Peduncles 1 in. Bracteoles 3, linear, toothed or almost pinnatifid, tomentose. Sepals 5, lanceolate, glandular on the inner surface at the base. Petals oblong; apex notched; claw villous, incurved. Staminal column short, bearing numerous anthers. Ovary ovoid, sessile, 10-celled, with numerous ovules in each cell. Stigmas 8-10, spreading. Capsule 2 by 1 in., woody, ovoid, acuminate, 10-valved; valves thinly pubescent or glabrescent. Seeds numerous. **Timber Trees.**

Rám Ghát, in the valleys of Mahábaleshvar, as well as in Burma and the mountains of Prome.

This tree attains sometimes the height of 30-60 ft., and a girth of about 4-7 ft. Fl. in the hot season; Fr. in the cold season; sheds its leaves in the hot season.

The wood is of a beautiful pink colour, mottled with orange and brown streaks, hard, tough, strong, close-grained, and takes a beautiful polish; used for gun-sticks, paddles, and rice-pounders—adapted for carpentry.

E. quinquelocularis, Wight; Bedd. Fl. Sylv. An. Gen. 35. *Budjari-dha-mun.*

A small tree; young parts stellate-tomentose. Leaves 2½-3 in. each way, round, or ovate, shortly acuminate at the apex, cordate at the base, palmately 7-nerved, serrate, thinly pubescent or glabrescent above, silvery and soft pubescent or tomentose beneath. Petiole 2 in. Flowers 1 in. diam., on long peduncles, arranged into cymes at the ends of branches. Bracteoles minute, 3-5-lobed, very caducous. Sepals 5, ¾ in., oblong-linear, with 2 glands within at the base. Petals 5, about the length of the sepals; claw coriaceous, dilated, hairy. Staminal column as long as the petals, conical, covered with numerous anthers, confined more to the apex. Ovary ovoid, 5-celled, with numerous ovules in a double row, in each cell. Style 1, slender. Stigma 5-lobed, lobes hairy, revolute or spreading. Capsule 1¼ in. long, woody, 5-10-valved; valves not tubercled. Seeds numerous, winged.

The Konkan and Belgaum Gháts, as well as in the western forests of the Madras Presidency, the Nilghiries and Behár.

Alt. 1-4000 ft.

The wood is said to be strong, and is used for various purposes.

I have very good specimens of *E. stocksii* brought from Mahábaleshvar.

Melochia velutina, Bedd.—*Riedleia tiliæfolia*, Dalz. & Gibs. Bby. Fl. 24; Grah. Cat. Bby. Pl. 19. *Methuri.*

A tall shrub or small tree; young parts stellate-pubescent. Leaves 4 by 3 in. or larger, suborbicular, subcordate, acuminate, 5-7 nerved, more or less deeply serrate, thinly stellate-pubescent or glabrescent above, softly velvety-tomentose beneath. Petiole about 3 in. long, tomentose. Stipules ¼ in., leafy, broadly-cordate, more or less pubescent. Flowers ¼ in. diam., pale rose-coloured, on very short, tomentose pedicels, arranged in terminal and axillary, many-flowered, corymbose panicles. Calyx campanulate, 5-lobed; lobes connate to about the middle, greyish, tomentose. Petals 5, twice

Timber Trees.

the length of the sepals. Stamens 5, opposite to the petals, united at the base into a short tube, and inserted into a lobed disc; filaments flat, anthers introrse, 2-celled. Ovary sessile, 5-celled; each cell 2-ovuled. Styles 5, free, or connate at the base. Capsule oblong, ½ in., deeply 5-lobed, hirsute. Seeds solitary in each cell, brown, smooth, with a wing at the upper extremity.

This very ornamental flowering tree is common in gardens, and is found wild throughout the hotter parts of India, from the North West Provinces to the Konkan, Ava, the Mauritius and Malaya. In this Presidency it is not uncommon in its wild state at Bassein, Khandala and Belgaum.

Though generally shrubby, it grows to be a small tree, attaining the height of 20-30 ft. Fl. in the cold season, Fr. in the hot season, when it sheds its leaves partially.

Wood very light, even grained, soft and whitish, useful for toys.

Guazuma tomentosa, Kunth.; Dalz. & Gibs. Bby. Fl. Suppl. 11; Grah. Cat. Bby. Pl. 18. *Bastard cedar* of the English.*

Young parts shortly stellate-tomentose. Leaves 3-1½ by 2 in., obliquely-ovate or oblong-lanceolate, acuminate at the apex, unequally cordate at the base, irregularly serrate, scabrous or glabrescent above, pubescent or tomentose beneath. Petiole about ½ in. Flowers numerous, small, yellow, or dark-purple in terminal and axillary, cymose panicles. Sepals 5, connate below the middle. Petals 5, sub-unguiculate and concave at the base, produced at the apex into 2 linear, ligulate processes. Stamens 10, united in a column, tubular at the base, and terminated above by 5 fertile, 3-antheriferous filaments, and 5 lanceolate staminodes. Anthers 2-celled; cells diverging. Ovary sessile, 5-lobed, 5-celled, with numerous ovules in each cell. Styles 5, more or less connate; stigma simple. Capsule woody, indehiscent, oblong or sub-globose, 1 in. long, tubercled, black, many-seeded.

Native of tropical America, but cultivated in the warmer parts of India and Ceylon, and common about Bombay.

This evergreen tree attains the height of 30-60 ft. and a girth of 2-5 ft. Fl. at the beginning of the rainy season; Fr. towards the beginning of the cold season.

The wood is light, loose-grained, coarse, fibrous, and of a light-brown colour, takes a good polish, good for furniture, panels, packing cases, etc. The leaves are excellent fodder for cattle. The bark abounds in mucilage, which is used in the Mauritius for the clarification of sugar. It is said to be useful in elephantiasis and leprosy (*See* Fibres.)

TILIACEÆ.

This family is represented in this Presidency by many herbs and shrubs and by the following trees:—

Grewia liliæfolia, Vahl.; Dalz. & Gibs. Bby. Fl. 26; Brand. For. Fl. 4 1. *Dhaman, dhamin, pharsa.*

Young shoots pubescent with minute stellate hairs. Leaves 4 by 2 in., ovate or roundish, acuminate, obliquely cordate, 3-5-nerved at the base, bluntly toothed or serrate, coriaceous, sparingly minutely stellate hairy or glabrescent above, hoary pubescent beneath. Petiole ½-1 in., pubescent or glabrescent. Stipules broad-lanceolate, leafy,

falcate, auricled, caducous. Peduncles axillary, 2-3 together (sometimes numerous), equal to or a little longer than the petioles, 3-5 flowered. Pedicels small, pubescent, furnished with bracts. Flowers yellow. Sepals ¼-½ in., tawny-velvety outside, glabrous inside. Petals emarginate, linear-oblong, half the length of the sepals, with a fringed foveolate scale at the base of each. Stamens numerous, all fertile, free from the base, and inserted upon a raised glabrous torus. Anthers small, 2-celled. Ovary 4-celled, hirsute. Style about twice as long as the stamens; stigma 4-lobed. Drupe globose, size of a pea, glabrescent, bluish-black, when ripe 2-, rarely 4-lobed. **Timber Trees.**

Common in this Presidency as well as in Madras; found in Oude, Behár, Central Provinces, the Himalayas, and all over India and east tropical Africa.

Alt 4000 ft.

It attains the height of about 30-40 ft. with an erect, tolerably straight trunk 4-6 ft. in girth. Sheds its leaves in March; new leaves appear in April, when it flowers: Fr. June-October.

Wood of a light reddish-brown colour, turning to light-brown, compact, close-grained, light, moderately hard, elastic, durable and easily worked. Dr. Gibson says, however, that it is of no value: this must be an error, for it is valued where strength and elasticity are required, and is employed in carriage and cart building; buggy-shafts, walking-sticks, handles, masts, oars, etc., are also made of it. Young twigs and leaves make a good fodder for cattle. The liber yields a fibre from which cordage is made. The fruit, which has an agreeable acid flavour, is eaten by natives. (*See* Fibres.)

G. Asiatica, Linn.; Dalz. & Gibs. Bby. Fl. 26; Brand. For. Fl. 40. *Phalsa* or *phalsi*.

Shoots, underside of leaves, and inflorescence covered with soft yellowish tomentum. Leaves 2-7 by 3-4 in., obliquely cordate or broad-ovate, rotundate, acuminate, 5-7 nerved, irregularly toothed, glabrescent above. Petiole ½ in., tomentose, enlarged at the top. Stipules linear-lanceolate, subulate, nearly as long as the petiole, often with a broad, oblique base. Peduncles axillary, 2-7 together, usually shorter, sometimes longer than the petioles, bearing from 3-5 flowers on bracteate, puberulous pedicels. Flowers yellow, ¾ in. diam. Sepals oblong-lanceolate, generally ¾ in. long, reddish-brown or yellow internally. Petals linear-oblong, obtuse, or emarginate, ½ the length of the sepals, with a small, foveolate, villous or fringed scale at the base. Stamens numerous, all fertile, free and inserted on a raised glandular torus; filaments red. Ovary densely villous. Drupe the size and shape of a pea, dark-brown, indistinctly lobed with 1 or 2, 1-seeded nuts.

Found all over India in a cultivated state; indigenous in Poona, Salt Range, Oude and Ceylon.

This shrub or small tree attains the height of about 20 ft., with a short trunk and a girth of 3-5 ft. Fl. March; Fr. April-May; sheds its leaves in the cold season, and is covered with new foliage about the end of March.

Wood is reddish brown or light pink in colour, close-grained, strong and elastic, good for the same purposes as those of the above-mentioned tree. The pleasantly acid fruit is eaten, and a sherbet is made of it at Surat. The mucilage of the bark is used for clarifying sugar in Saharunpore. The liber yields fibre, which is made into ropes.

G. vestita, described by some authors as a distinct species, is a variety of the above-named tree.

Timber Trees.

It is found in Eastern Bengal, Behár, Central Provinces and the Himalayas, and grows to a height of about 25 ft., with 2 ft. in girth. Fl. January-May; Fr. August-November. New leaves appear in May.

Some other shrubby species of this genus grow under favourable circumstances to be trees attaining the height of 20-25 ft. These are:— *G. villosa; G. pillosæ, phalsar; G. microcos, shiral, assalé* at Goa; *G. polygama, gowli; G. Ritchiei.* All these are found in the Deccan and Konkan.

Erinocarpus Nimmonii, Grah. Cat.; Dalz. & Gibs. Bby. Fl. 27; Grah. Cat. Bby. Pl. 21. *Chowra* or *jungli-bhendi.*

A small tree. Leaves 5-8 in. each way, roundish-cordate, irregularly-toothed, palmately 5-9-nerved, sometimes 3-5-lobed; lobes acute, glabrous above, pubescent or glabrescent beneath. Petiole 2-5 in. Stipules caducous. Flowers yellow, nearly 2 in. diam., on short pedicels in large, terminal, lax panicles. Bracts cordate-ovate, caducous. Sepals 5, distinct, stellate-pubescent externally. Petals 5, with pit-like glands inside at the base. Stamens numerous, inserted on an elevated torus, free or slightly connate at the base. Ovary pubescent, 3-celled, with 2 ovules in each cell. Style filiform; stigma minute. Fruit 2 by 1½ in., bristly, woody, indehiscent, triangular, 3-winged, 1-celled by abortion. Seeds solitary, pendulous, oblong.

This small handsome tree is common at Khandála, on the top of Karanja Hill, at Jambuti near Belgaum, and throughout the Konkan and the Deccan.

Fl. September-October; Fr. in the cold season.

The quality of the wood is not known; ropes are made from the fibres of the bark.

Elæocarpus ganitrus, Roxb.; Dalz. & Gibs. Bby. Fl. 27; Brand. For. Fl. 43. *Rudrak, rudraksh.*

A large tree; young parts silky-pubescent. Leaves 5-6 by 2 in., approximate towards the ends of the branches, oblong-lanceolate or elliptic, acute at the apex, obtuse, or narrowed at the base, serrulate, glabrescent, slightly silky when young. Petiole ½-¾ in., glabrous. Stipules minute, caducous. Flowers ⅓ in. diam., white, on slender, short, slightly silky-hairy pedicels; forming numerous, rather dense, drooping racemes. Sepals 5, lanceolate, acute, as long as the petals, slightly pubescent on both sides, with a rib in the middle internally. Petals 5, somewhat puberulous or glabrescent, oblong, deeply laciniate. Stamens 25-40, short, and inserted on the convex torus; anthers naked, or armed with short hairs. Ovary ovoid, silky-villous, 5-lobed, 5-celled, with about 4 ovules in each cell. Style longer than the stamens, 5-grooved; stigma simple, acute. Drupe globose, the size of a large cherry, smooth, purple. Nut spherical, elegantly tubercled, 5-grooved. Seeds generally solitary.

At Mahábaleshvar and the other higher ghâts of the Konkan as well as on those of Madras; Central Provinces, Nepaul, Assam, Malacca, and the Malayan Archipelago.

Fl. in the cold season; Fr. in the hot and rainy season.

The hard tubercled nuts of this and several other species are polished, made into beads, and are worn around the neck by fakirs and Bráhmans; they are also often set in gold and made into bracelets.

E. oblongus, Gærtn.; Dalz. & Gibs. Bby. Fl. 27; Grah. Cat. Bby. Pl. 21. *Kassow, kas, azeitonas* (wild olives) *de Malabár* of the Portuguese. Timber Trees.

A middling-sized tree. Leaves 3-4 by 1¾-2 in., alternate, elliptic, or elliptic-oblong, acute or acuminate at the apex, somewhat cuneate at the base, serrate, with blunt serratures, glabrous, thick, dark-green, shining. Petiole ¾-1 in., with a small gland on each side near the apex. Flowers white, ¾ in diam., glabrous, faintly fragrant, on slender pedicels, in simple racemes, from the axils of fallen leaves, and shorter than the latter. Sepals 5, lanceolate, brownish-red. Petals 5, deeply laciniate, longer than the sepals. Stamens 30-40; filaments very short. Anther-valves naked or bearded. Ovary sessile, 3-celled, with 2 ovules in each cell. Style longer than the stamens; stigma simple. Drupe 1 in. long, oblong, purple, indehiscent. Nut oblong, 1-celled, 1-seeded, hard, indehiscent, prominently tubercled.

Found in the forests of this Presidency from Maháblaleshvar and the Konkan to Travancore, and in those of Madras, Tenasserim, Borneo and the Moluccas. It is common at Mahabaleshvar, in the valley of the Yenna River, and at Lingmalla.

This handsome tree sometimes grows to a large size. Fl. May-June; Fr. in the rainy season. "When in full bloom this is certainly a most beautiful tree."

The wood is white, close-grained, strong, tough and dense-fibrous; useful for the lathe. The fruit has an agreeable acid taste, and is eaten in some places. The unripe ones are pickled.

E. tuberculatus, Roxb.; Bedd. Fl. Sylv. t. 113.—*Monocera tuberculata*, Dalz. & Gibs. Bby. Fl. 27. This tree is also called *rudrak, udrak*.

Leaves crowded at the ends of the branchlets, 6-12 by 3-4 in., oblong-obovate and ovate-cuneate, or retuse at the base, remotely serrulate, glabrous above, and more or less downy along the nerves beneath. Petiole 1½-2 in., round, villous or glabrescent. Stipules subulate, hairy, deciduous. Flowers 1 in. diam., white, on drooping pedicels, arranged in erect racemes below the leaves, more than twice the length of the petioles. Bracts lanceolate, caducous. Sepals 5, lanceolate, downy on both sides. Petals 5, cuneate, deeply laciniate, sometimes bifid, villous on the outside and glabrous inside. Stamens numerous (70-80); filaments short; very hairy or glabrous; anthers linear, longer than the filaments, terminated by a long awn. Ovary ovate, a little compressed, villous, 2-celled, with several ovules in each cell, in 2 rows. Style somewhat longer than the stamens; stigma simple. Drupe oval, smooth, 1½-2 in. long. Nut woody, ovate or oval, compressed, tubercled on the flattened sides, distinctly furrowed, 1-2-celled, with the margins thickened. Seeds generally solitary, ovate, thin.

Common at Rám Ghát, Malabár, Travancore, Coorg, Pegu, Martaban and Java.

This very large evergreen tree grows to the height of 50-80 ft. Fl. at the commencement of the hot season; Fr. at the end of May and in the rainy season.

Timber Trees.

Wood white, soft, but requires an examination. The nuts are worn by Hindus and fakirs as rosaries like those of *E. ganitrus*.

E. Munroii, Mast; Wight's Illustr. 84.

Leaves towards the ends of branchlets, 3 by 2 in., ovate-lanceolate, acuminate, slightly serrulate, without glands on the under surface, glabrous. Petioles 2 in. Flowers ½ in. diam., pure white, on slender, drooping, about ¾ in. pedicels, in many-flowered racemes, nearly as long as the leaves. Sepals 5, lanceolate, acute. Petals 5, deeply laciniate. Stamens numerous, glabrous. Anthers linear, longer than the filaments, terminated by a long awn. Ovary ovate, villous, 2-celled, on a raised torus, with 4 ovules in each cell. Style longer than the stamens; stigma simple. Drupe oblong, yellowish, shining, size of an olive. Nut 1-celled, coarsely and irregularly tubercled. Seeds solitary, oblong.

In the Southern Konkan in this Presidency, in Coorg, the Nilghiries and perhaps other parts of the Madras Presidency.

This large, truly magnificent tree attains sometimes the height of 60-80 ft., and when covered with flowers is a sight to look at—its white flowers forming a splendid contrast with the deep green foliage. Fl. in the cold season; Fr. February-March.

The quality of the wood is not known. The drupe is eaten by the natives; the unripe ones are pickled.

GERANIACEÆ.

Averrhoa carambola, Linn. *Kamaranga.*

Grows to the height of about 25-35 ft. and a girth of 3-4 ft. Fl. in the hot and rainy seasons; Fr. in the cold season.

Wood dark-brown, and said to be used in the Sunderbands for building purposes and furniture.

A. bilimbi, Linn. *Bilimbi, blimbu, anwalla.* Fl. in the hot season; Fr. in the rainy season.

Both the above plants are extensively cultivated throughout India for the sake of their acid fruits, which are used in curries and candied; their acid juice is employed in removing iron moulds.

RUTACEÆ.

A most important order containing the valuable orange plant and other species of the genus *Citrus*, as well as a few useful timber trees.

Evodia Roxburghiana, Benth.—*Zanthoxylum triphyllum*, Dalz. & Gibs. Bby. Fl. 45; Grah. Cat. Bby. Pl. 36.

An unarmed tree; branches opposite; young parts round and somewhat villous. Leaves opposite, trifoliolate; petiole 2-5 in., leaflets shortly petioluled, 2-5 by 1-2 in., oblong-elliptic or oblong lanceolate, acute, or acuminate, entire, shining above, pale beneath, and glabrous on both sides. Flowers numerous, small, densely crowded, yellowish-green, inodorous, tetramerous, on very short pedicels, in axillary, puberulous, dichotomously brachiate, cymose panicles. Bracts minute. Calyx minute, puberulous, 4-toothed. Petals oblong, spreading, about 4 times as long as the segments of

the calyx. Stamens inserted at the base of the disc; filaments glabrous, subulate; anthers oblong. Ovary roundish, hairy, deeply 4-lobed, 4-celled with 2 ovules in each cell. Style basilar; stigma large 4-lobed. Capsules 1-4, usually 2 when ripe, obovate, smooth, coriaceous, size of a field-bean. Seed smooth, shining, blue-black.

Khandála, Parr Ghát, Mahábaleshvar and throughout the forests of the Eastern and Western Peninsula, from Tenasserim to Malaya and Penang; Ceylon, Sumatra, Java, and the Khasia Hills.

Alt. 4000 ft.

This small evergreen tree attains the height of about 25-30 ft. and 2-3 ft. in girth. Fl. April May; Fr. in the rainy season.

The wood is said to be strong.

Zanthoxylum Rhetsa, D. C Prod; Dalz. & Gibs. Bby. Fl. 45; Grah. Cat. Bby. Pl. 36. *Sessal, chirphal, tijabal, tephal* (at Goa).

A large tree; trunk straight; branches numerous, spreading; prickles straight or incurved, on every part of the tree. Leaves about the ends of branches, 1-1½ ft. long, equally or unequally pinnate. Petiole not winged. Leaflets opposite, from 8 to 20 pairs, 3-5 by 2 in.; oblong-lanceolate, acuminate, unequal-sided, entire, glabrous, short-petioluled. Flowers small, yellow, dioecious, tetramerous, numerous on terminal and axillary 1½ ft. broad, dichotomously branched cymes; branches opposite, slightly compressed or angled. Bracts minute, caducous. Petals valvate, longer than the sepals. Disc small. Ovary rudimentary in the male flower, glabrous; in the female 1-celled, 1-ovuled. Style thick; stigma tapering. Capsule sessile, solitary, globose, size of a pea, tubercled. Seed 1, round, shining, black.

This tree grows at Khandála, Sávantvádi from the Konkan and Goa to Coromandel. Fl. in the cold season, when it is leafless; Fr. February.

Wood yellowish white, but its quality is not known. Every part of this tree possesses a peculiar aromatic pungent smell, the unripe carpels taste of orange peel, and the seeds are hot, and taste like black pepper, and are used as condiment. (*See* Oils.)

Acronychia laurifolia, Blume.—*Cyminosma pedunculata*, Dalz. & Gibs. Bby. Fl. Suppl, 17.—*Clausena simplicifolia*, Dalz. & Gibs. Bby. Fl. 30.

A glabrous tree; young shoots and inflorescence puberulous. Leaves 1-foliolate, opposite 2-6 by 1½-2 in., elliptic, oblong-lanceolate, obtusely acuminate, entire, glabrous, with minute pellucid dots, petiole 1-1½ in. Flowers polygamous ⅓-⅔ in. diam., yellowish-green, fragrant, on longish, slender pedicels, on axillary, oppositely branched, corymbose cymes. Bracts and bracteoles small. Calyx 4-lobed, very small. Petals 4, ovate, linear-oblong, obtuse, revolute, valvate. Stamens 8; filaments alternately shorter, subulate, as long as the petals, villous below and inserted on a thick, 8-angled disc. Ovary tomentose, 4-celled, with 2 superposed ovules in each cell; style short; stigma capitate, 4-grooved. Drupe obsoletely 4-angled, 3-5-celled, apiculate, size of a large pea. Seeds black.

In this Presidency it grows at Talkat Ghát; and found all over India, Ceylon, Rangoon, Penang, Malacca, Sumatra, Java and Cochin-China.

Alt. 3-4000 ft.

Timber Trees.

An evergreen tree; attains the height of 10-20 ft. and a girth of 2-3 ft. Colonel Beddome says: "It appears to be in flower and fruit in all seasons;" but it flowers chiefly in the rainy season.

Wood very light, close-grained; adapted for inlaying purposes and charcoal.

Murraya exotica, Linn.; Dalz. & Gibs. Bby. Fl. Suppl. 12; Brand. For. Fl. 46. *Kunti; marchula juti.*

A glabrous unarmed tree; young parts pubescent. Leaves imparipinnate, 4-5 in. long, glabrous, 3-9 foliolate. Leaflets 1-3 by 1 in., obliquely-ovate or obovate, obtuse, often notched at the end, smooth, shining, deep-green above, shortly-petioluled. Flowers campanulate, pure white, exquisitely fragrant, about ½ in. diam., in terminal and axillary corymbs. Sepals 5, glandular, erect, acute. Petals 5, lanceolate, imbricate. Stamens 10, free, alternately shorter. Filaments subulate, inserted around a fleshy disc. Ovary oblong, 2-celled, with 1 ovule or 2 superposed in each cell. Style thick as long as the stamens; stigma capitate, glandular. Berry red, ½-1 in. long, acuminate, globose or ovoid; 1-2-seeded. Seeds oblong, flat on one side, villous.

This elegant tree is cultivated in gardens on account of its fragrant flowers and handsome foliage: found wild in Southern India, Oude, Behar and throughout the hotter parts of India, Ceylon, Burma, China, Australia and the Pacific Islands.

Alt. 4500 ft.

It attains sometimes the height of 15-25 ft. and a girth of 1½-2 ft. This evergreen tree flowers throughout the year, but in greater profusion in May-September; Fr. October February.

M. Kœnigii, Spreng.; Brand. For. Fl. 48.—*Bergera Kœnigii*, Dalz. & Gibs. Bby Fl. 29. *Kadhianim, kadhinim, karipak.*

An unarmed tree, pubescent or tomentose, rarely glabrous. Leaves about 1 ft. long, 11-21-foliolate, pubescent or glabrous. Petiole slender, round, pubescent, not winged. Leaflets 1-1½ in., shortly petioluled, alternate, ovate-lanceolate, obtusely acuminate, slightly emarginate, usually oblique at the base, crenulate. Flowers white, fragrant, ½ in. long, ebracteate, in dense terminal corymbiform panicles. Sepals 5, acute, persistent. Petals 5, oblong-lanceolate, acute or obtuse, about 2-4 lin. long, dotted. Stamens 10, alternately longer. Filaments dilated below, and inserted around the elongated disc. Anthers small. Ovary 2-celled, with 1 ovule in each cell or 2 superposed. Style short, thick; stigma capitate. Berry ovoid or subglobose, size of a small pea, 1-2-seeded, bluish-black, rugose. Seeds imbedded in mucilage.

In this Presidency it is common on the gháts; found wild at Mahábaleshvar, Máthérán and other gháts of the Konkan, Malabár, Travancore, Madras, Bengal, along the foot of the Himalayas from Garwhal to Sikkim, Pegu, and Ceylon. It is also cultivated.

Alt. 4-5000 ft.

Attains the height of 15-20 ft. and a girth of 1½-2 ft. It is an evergreen tree. Fl. in the cold season; Fr. June onwards.

Wood white, close-grained, hard, heavy and durable; used for agricultural implements, etc. All parts of this plant have a powerful, rather disagreeable, odour. The leaves are used in curries as a condiment, and these with the bark and root are used by hakims as a stomachic, tonic. (*See* Oils.)

Clausena Indica, Oliv.; Bedd. Fl. Sylv. An. Gen. 45.—*Piptostylis Indica*, Dalz. & Gibs. Bby. Fl. 29. Timber Trees

An unarmed shrub or small tree, branchlets slender, puberulous. Leaves 7-11 foliolate, 4-10 in. long, glabrous; common petiole slender, round, glabrous or puberulous. Leaflets, 2-4 in., alternate, elliptic or ovate-lanceolate, obtuse, notched, acute or obtusely acuminate, very oblique, crenulate, subcoriaceous, shining, dark and marked with prominent glands on both surfaces when dry. Flowers ¼ in. diam., pentamerous, glabrous, white, on very short pedicels, in terminal, corymbiform panicles as long as the leaves; peduncle hoary. Petals ovate-oblong, elliptical. Stamens 10, alternate shorter; filaments dilated below and inserted on an elongated disc. Anthers small. Ovary globose or oblong, glabrous, verrucose with pellucid glands, 2 sometimes 3-5-celled. Ovules 2 in each cell, collateral. Style deciduous; stigma 4-lobed. Fruit ½ in. diam., globose, yellow, pulpy, 1-2-celled; cells 1-2-seeded, usually 1-seeded. Seeds oblong.

This small tree is found at Panvar Ghát in this Presidency; Anamallay Hills and Ceylon.

Fl. March; Fr. in the rainy season.

Wood is close-grained, hard, and adapted for the lathe.

Limonia acidissima; Linn.; Dalz. & Gibs. Bby. Fl. 29; Brand. For. Fl. 47. *Naringi, limoens da folha crusada* in Portuguese.

A glabrous tree, armed with straight thorns ½-1 in. long, mostly solitary, axillary; branches rigid, woody. Leaves alternate, imparipinnate, 1-4 in. long; common petiole jointed, winged. Leaflets usually 5-9, 1-2 in., sessile, opposite, oblong or ovate-lanceolate, obtuse, notched or retuse at the apex, cuneate at the base, the terminal one larger, crenate and punctate with pellucid dots; joints of rachis crenulate. Flower ½ in. diam., white, fragrant, tetramerous, on slender pedicels, in axillary, 1 in. long, pubescent racemes; frequently bearing 1 or 2 leaves. Sepals small, ovate or triangular. Petals oblong-elliptic, twice the length of the calyx, pellucid, punctate. Stamens 10, free, nearly equal. Filaments subulate, inserted on an annular or columnar disc. Anthers cordate-oblong. Ovary oblong, 4-celled. Ovules 1 in each cell, pendulous. Style short, thick; stigma capitate. Berry globose, ½ in. diam., black, 1-4-seeded, very acid. Seeds imbedded in mucilage.

Very common on the Eastern and Western Ghâts, Padshapore, Falls of Gokák, Monghyr Hills, Behár, Simla, Kumaon and all over India.

Alt. 4000 ft.

Attains the height of 20-25 ft. and a girth of 1-2 ft. Fl. in the hot season; Fr. in the rainy season.

Wood yellow, hard and close-grained. Used for axils of oil-presses, rice-pounders, etc., and adapted for the lathe. The berry is much used as a stomachic tonic in Malabár, where it forms an article of commerce; its mucilage is of a red colour, very acid, and is considered to be an antidote against poisons of animals.

Atalantia monophylla, Correa; Dalz. & Gibs. Bby. Fl. 28; Bedd. Fl. Sylv. An. Gen. 46. *Rhan* or *makar-limbu, makar.*

A glabrous tree or large climbing shrub; branches rigid, woody; thorns small, strong, sharp, solitary, axillary. Leaves unifoliolate,

Timber Trees.

2-3 by 1-1½ in., alternate, ovate, or ovate-oblong or elliptic, obtuse or 2-lobed at the apex, entire, persistent, coriaceous, bright-green. Petiole very short, often puberulous. Flowers white, ⅓-1 in. diam., fascicled in the axils of leaves, or arranged in short, sessile racemes. Pedicels ½-1 in., slender, usually pubescent, but soon glabrescent, minutely bracteolate. Calyx irregularly cleft to the base, lobes 2-5, entire and somewhat scarious. Petals 4-5, obovate-oblong, obtuse. Stamens 8, sometimes 5-7, united below into a long tube. Anthers cordate-ovate. Ovary glabrous, sessile, on a small disc, 4-, rarely 3-5-celled, usually with 1-2 ovules in each cell. Style deciduous; stigma capitate. Berry globose, size of a nutmeg, yellowish, glabrous, usually 4-celled; cells 1-seeded. Seeds oblong.

Common at Matherán, Mahábaleshvar, and the other ghâts from the Konkan to Coromandel; also in Silhet, foot of the Khasia Hills and in Ceylon.

It is generally a large evergreen shrub, which sometimes grows to be a small tree. Fl. October-November; Fr. February.

Wood pale yellow or white, close-grained, hard and heavy, resembling somewhat boxwood; and when of some size valuable for turning and cabinet purposes. (*See* Oils.)

Feronia elephantum, Correa; Dalz. & Gibs. Bby. Fl. 30; Brand. For Fl. 56. *Kavita, kait, kat-bel, kawit, kawat, elephant* or *wood-apple* tree.

A glabrous tree, armed with strong, straight, axillary thorns. Leaves 2-4 in., alternate, imparipinnate, quite glabrous, shining. Petiole slightly winged or not. Leaflets 5-7, about 1¼ in. long, opposite, lanceolate, cuneate or obovate, obtuse, entire or crenate towards the apex, membranous, almost sessile. Flowers polygamous by abortion, ½ in. diam., dull red, on slender pedicels, in terminal or axillary, lax panicles. Calyx small, 5-toothed, deciduous. Petals 5, sometimes 4-6, spreading, imbricate. Stamens 10-12, inserted around a short disc. Filaments dilated at the base. Anthers linear-oblong. Ovary in the male flower small, abortive; stigma 5-lobed. Ovary in the female flower, oblong, 5-6-celled, or at length 1-celled. Style none; stigma large, 5-lobed, deciduous. Ovules numerous in several series. Berry large, 2½ in. diam.; or larger, globose, woody, hard, grey-coloured, rough, 1-celled, many-seeded. Seeds numerous, imbedded in a fleshy edible pulp.

Common in the Konkan, Deccan, and throughout India; also cultivated for the sake of its edible fruit.

Alt. 1500 ft.

Usually grows to the height of 20-30 ft. and a girth of 2-4 ft., sometimes more. Fl. February-April; Fr. in the beginning of the rainy season—the fruits remaining long on the tree. It sheds its leaves during the hot season.

Wood yellowish-white or light-brown, rather heavy, hard, even-grained, strong, takes a fine polish; used for house-building, oil-crushers and agricultural implements; well suited for ornamental carving. A white, transparent gum, resembling gum arabic, exudes from the trunk; this, mixed with the gum of the *nim, mango, babal, khair, siris* and of several other trees, forms part of the East Indian gum arabic of commerce. The pulp of the fruit, which is slightly acid and sweet, is eaten, and makes a pleasant jelly and syrup. The leaves have a slight smell of aniseed, and

are used medicinally by the natives as a stomachic tonic. The unripe fruit is an astringent, and is administered in the form of decoction. Timber Trees.

Ægle marmelos, Correa; Dalz. & Gibs. Bby. Fl. 31; Brand. For. Fl. 57. *Bael, bel, billi.*

A glabrous tree, armed with axillary, straight, strong thorns, 1 in. long; branches sometimes drooping. Leaves 3-foliolate, alternate. Leaflets 3 (very rarely 5), oblong or broadly ovate-lanceolate, acute or obtusely acuminate, crenulate, membranous, inconspicuously pellucid-punctate, the lateral ones smaller and almost sessile, the terminal one much larger, 2-2¼ by 1 in., long-petioluled. Flowers 1¼ in. diam., greenish-white, sweet-scented, on long slender, pubescent pedicels, forming axillary puberulous racemes. Calyx pubescent, deciduous. Petals oblong, coriaceous, thickly dotted, patent, imbricate. Stamens numerous (30-40). Filaments distinct, subulate, inserted round a small disc. Anthers linear-oblong. Ovary ovoid, 8-20-celled; cells near the circumference, with numerous, 2-seriate ovules. Style short; stigma capitate or oblong, deciduous. Fruit woody, globose, oblong or sometimes pyriform, 2-5 in. diam., smooth, grey or yellow. Seeds numerous, oblong, wooly, imbedded in a thick, sweet, aromatic, orange-coloured pulp.

Wild in Gujarát and the Deccan, and cultivated in Bombay, Elephanta and the Konkan; grows also in Madras, Bengal, Central India, Oude, Behár, Western Himalayas, Burma and all throughout the dry hilly parts of India.

Alt. 4000 ft.

This useful tree attains 30-40 ft. in height and 3-4 ft. or more in girth. Fl. towards the end of the hot season; Fr. in the rainy season. Sheds its leaves about March and April; the new foliage appears towards the end of the hot season.

Wood yellowish-white, mottled, close-grained, and takes a beautiful polish; said to emit a strong aromatic scent when fresh cut, but is eaten by insects. Used in the construction of carts, agricultural implements, pestles of oil and sugar mills, etc. The pulp of the fruit, which is officinal in the Indian Pharmacopœia, is valuable in diarrhœa and dysentery. It is often added to mortar to render the latter more tenacious. Snuff-boxes are said to be made of the rind. Twigs and leaves are used as cattle fodder. From the flower a sweet-scented water is distilled.

SIMARUBEÆ.

Ailanthus excelsa, Roxb.; Dalz. & Gibs. Bby. Fl. 46; Brand. For. Fl. 58. *Maharuk.*

Leaves abruptly pinnate, 1-2 ft. long; young ones more or less villous, old glabrous. Leaflets nearly opposite, 8-14 pair, 2-4 by 1½-2 in., ovate, often broad falcate-lanceolate, acuminate at the apex, very unequal at the base, long-petioled, coarsely and deeply toothed, often lobed. Flowers yellowish, polygamous, small, about 3 lin. diam., on slender longish pedicels, arranged in axillary, large, often very much-branched panicles. Petals glabrous within, ovate-lanceolate, usually reflexed. Stamens in male flowers 10 (in the hermaphrodite 2-3). Ovary rudimentary or none. Stamens in female flower abortive. Ovary 2-5-partite with 1 ovule in each cell. Samara 2 by ½ in., lanceolate, blunt or pointed at both ends, copper-red, always once or twice twisted at the base, and marked with numerous prominent veins.

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Common in this Presidency at Broach, Baroda, the Deccan, Madras, Central Provinces and Behár.

It is a handsome large tree, 60-80 ft. high. Fl. February-April; Fr. at the end of the hot season. Sheds its leaves during the cold season, and is covered with new leaves March-April.

Wood white, soft and spongy, not durable; it is only used in making sword handles, spear sheaths, and floats for fishing nets, etc. The bark is used as a febrifuge and tonic.

A. Malabarica, D. C. Prod.; Dalz. & Gibs. Bby. Fl. 46; Brand. For. Fl. 58. *Wud, muddhedup, matti-pal.*

Bark thick, rough, often studded with bright, reddish grains of resin. Leaves 15-20 in. long, unequally pinnate, quite glabrous. Leaflets 6-10, 3-7 by 1½ in., subopposite or opposite, distant, long acuminate, the base and two sides very unequal; margin often thickened and undulated, almost entire, coriaceous, shining above, pale beneath. Petioles long; petiolules 3-4 lin. Flowers small, white, on small, pubescent pedicels, forming large terminal panicles; nearly as long as the leaves. Calyx slightly pubescent and ciliate. Petals nearly 3 lin. long, slightly imbricate at the edges. Disc 10-lobed, with a minute, rudimentary, 3-lobed ovary in the male flower. Stamens much longer than corolla. Female flower with 10 sterile stamens, alternately shorter. Samara 2½ by ¾ in., oblong, reddish, obtuse at both ends, veined, not twisted.

Common in the forests of the Western Gháts down to Cape Comorin; Indapore near Mahár, Khandála, and in the States belonging to Pant Sachu, Kánara, Ceylon and Cochin-China.

A lofty tree 60-80 ft. high. Fl. February-March; Fr. towards the end of the hot season. Sheds its leaves in the hot season.

Wood white, soft, light and useless. The trunk yields a reddish, aromatic, resinous substance known as *matti-pal;* this is esteemed as a very efficacious remedy in dysentery, generally administered in the form of powder and mixed with milk. Dr. Gibson thinks that it is a good stimulant in chronic bronchitic affections; this substance is also used as an incense. The bark, which has a pleasant and a slightly bitter taste, is used by natives in cases of fever.

The late Mr. Náráyan Dájee read a paper on the virtues of the bark of this tree at one of the meetings of the Grant College Medical Society.

Samadera Indica, Gærtn.; Grah. Cat. Bby. Fl. 37; Bedd. Fl. Sylv. An. Gen. 49.

Leaves 6-10 by 3 in., oblong or elliptic-lanceolate, acute or obtuse at the apex, narrow at the base, coriaceous, fleshy, glabrous, shining, quite entire, generally furnished with 2 hollow glands at the base near the insertion of the petiole, and often with similar ones spread over the blade. Petiole thick ¼-¾ in. Flowers yellowish-white or purplish, numerous, in dense umbels. Peduncle very long; pedicels small. Calyx segments 4-5 small, persistent in fruit. Petals linear-oblong. Stamens twice as many as the petals. Filaments with a scale at the base. Ovary generally 4-celled. Drupe 1½ by 1 in., with a very thick pericarp.

Not uncommon in the forests of Southern Konkan, Goa, Malabár Coast, Ceylon and Tenasserim.

This tree attains the height of 30-35 ft. Fl. in the cold season; Fr. March-April. It appears to be evergreen.

Wood light-yellow, soft and close-grained. The wood, fruit and seeds are very bitter, and used by the natives as a febrifuge and tonic. Timber Trees.

Balanites Roxburghii, Planch.; Brand. For. Fl. 59.—*B. Egyptiaca*, Grah. Cat. Bby. Pl. 23. *Hingota, hingol.*

All young parts greyish pubescent, armed with very strong, sharp, ascending, solitary spines, frequently bearing leaves and flowers. Leaves bifoliolate, in short petiole. Leaflets 1-1½ in., elliptic or obovate, entire, puberulous, shortly petioluled, coriaceous. Flowers greenish-white, fragrant, in axillary, 4-10-flowered cymes. Sepals and petals 5, ovate, tomentose within, imbricate. Stamens 10, inserted at the base of a thick, conical disc. Ovary entire. Drupe woody, ovoid, about 2 in. long, 5-grooved, with a smooth, light-grey rind. Nut hard, 1-seeded, imbedded in an offensive smelling, greasy pulp.

Common in Gujarát, Panch Mahâls, Kaira, Cutch, Khándesh, the Deccan, Behár, Central Provinces, Sikkim and other dry parts of India; also in Burma.

In favourable circumstances this tree grows to the height of 30 ft. with an erect short trunk, 2 ft. or more in girth. Fl. in the hot season; Fr. in the rainy season. Leafless in the cold season; covered with new leaves in March.

Wood yellowish-white and moderately hard, chiefly used for fuel; but walking-sticks and shoe-maker's boards are also made of it. From the seeds a fixed oil, called *zachun*, is extracted; and the pulp is used to clean silk in Rájputána. The hard nut is employed in native fireworks; the kernel being scooped out through a small hole, and filled with gunpowder, explodes with a loud report. The bitter bark, subacid leaves and seeds are much used by hakims.

OCHNACEÆ.

Ochna squarrosa, Lin.; Dalz. & Gibs. Bby. Fl. Suppl. 17; Grah. Cat. Bby. Pl. 37; Brand. For. Fl. 60. *Kanuk-champa.*

A glabrous shrub or small tree. Leaves 6-7 by 2 in., oblong-ovate or obovate or elliptic-oblong, obtuse or pointed at both ends, slightly serrated, shining. Petiole short. Flowers yellow, 1¼-1½ in. diam., numerous, on short axillary racemes or from the branches below the leaves. Sepals 5, persistent, oval-obtuse. Petals 5-12, clawed, deciduous. Disc large, lobed. Stamens numerous; filaments short, filiform; anthers very long, linear. Ovary deeply lobed, many-celled, with 1 ovule in each cell. Fruit of several carpels placed round the base of the style.

This handsome tree gows wild in the Konkan, Bengal and Burma; it is also cultivated on account of its flowers.

Fl. February-April; Fr. May-June. Leafless in the cold season; the new leaves appear February-March.

Wood reddish-brown, hard and close-grained.

Gomphia angustifolia, Vahl.; Grah. Cat. Bby. Pl. 38; Bedd. Fl. Sylv. An. Gen. 51. *Valermani.*

Glabrous tree. Leaves about 5 by 1½ in., ovate-oblong, or elliptic-blong, acute or acuminate at both ends, slightly serrated, coriaceous,

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glabrous, shining and dark-green above, and of a lighter colour below, sessile; midrib prominent. Flowers yellow, inodorous, ½ in. diam., on slender pedicels, arranged in terminal racemose panicles. Sepals 5, broad-ovate, coriaceous, shorter than petals. Petals 5, deciduous. Anthers 10, long, erect nearly sessile. Carpels 5, obovate, or reniform, with one ovule in each Styles connate, longer than the stamens. Stigma quite entire. Drupes size of a pea, red and shining, reticulated, surrounded by the red calyx.

Found in Southern Konkan and in the forests of the Madras Presidency, Ceylon, Singapore and the Philippines.

This evergreen tree in favourable places grows to the height of 30 ft.; it is almost throughout the greater part of the year in flower and fruit.

Wood is white, close-grained and hard, useful for building purposes. The root and leaves are bitter, and are used in Malabár in the form of decoction, mixed with milk as a tonic and stomachic. It is also used as an anti-emetic.

BURSERACEÆ.

Boswellia thurifera, Colebr.—*B. glabra*, Grah. Cat. Bby. Fl. 42; Brand. For. Fl. 61. *Salai, salya, dup-salai.*

Leaves alternate, 8-15 in., imparipinnate, near the ends of branches. Leaflets 17-31, 2-2½ in. by 6-7 lin., opposite or nearly opposite, lanceolate oblong, or ovate-lanceolate, rounded or obtuse at the apex, oblique at the base, coarsely serrate, sometimes entire, sessile or subsessile, sparingly pubescent, specially when young. Flowers white, about ¼ in. diam., in axillary or terminal racemes, shorter than leaves. Calyx segments 5-7. Petals broad-ovate, narrowed at the base into a claw. Disc red crenate. Stamens about 10, inserted at the base of the disc. Anthers hairy. Ovary 3-celled; stigma 3-lobed. Drupe ½ in. long, trigonous, separating septicidally into 3 valves.

Abundant in Sátpura forests, common in the Deccan, Belgaum (chiefly on the hill of Shendur), the Konkan and southward to the Circars; also in Rájputána, Behár and the forests at the base of the Himalayas.

This tree is about 30 ft. high with a girth of about 5-6 ft. Fl. March-April; sheds its leaves February-April, covered with new foliage in the rainy season.

Wood is of a brown colour, soft, coarse-grained, and not durable; its charcoal is used for iron-smelting in Nhemar. The trunk yields an abundance of transparent gum-resin, which is very fragrant, and when burnt, diffuses an agreeable odour. It is sold in the bázár under the name of *luban, salai, kundur*, and is often used as an incense in Roman Catholic churches. It is employed by the natives externally in the cure of indolent ulcers, and internally as a diaphoretic.

B. glabra, *salphuli* or *salai.*

This is supposed to be a variety of the former, and chiefly differs from it in the leaflets being larger, nearly or quite glabrous and minutely crenate.

Garuga pinnata, Roxb.; Dalz. & Gibs. Bby. Fl. 313; Brand. For. Fl. 62. *Kurak* or *kuruk, kangkur, ghogar, kaikar.*

Trunk strong, erect; young parts pubescent. Leaves about 1 ft. long or more, alternate, imparipinnate, near ends of branches. Leaf-

lets 18-19, 2-4 by 1-1¼ in., nearly opposite, lanceolate or ovate-lanceolate, acuminate at the apex, unequal at the base, subsessile, crenate, glabrous or tomentose. Flowers yellowish-white, in large compound pubescent panicles; bracts deciduous. Calyx teeth 5, ovate, pubescent. Petals 5, linear, inserted at the throat of the calyx, between its teeth. Stamens 10. Filaments, ovary and style hairy; anthers versatile. Drupe fleshy, smooth, size of a gooseberry, containing 1-5, 1-seeded nuts.

Common in the gháts and hilly parts of the Konkan and the Deccan and in every part of India; also in Burma, Malayan Archipelago and the Philippines.

Alt. 3500 ft.

Under favourable circumstances this tree attains the height of 50-60 ft. and a girth of 5-6 ft. Fl. early in the hot season; Fr about the end of the hot season and beginning of the rainy season. It sheds its leaves in the cold season, covered with new foliage early in the hot season.

Wood is whitish with a reddish centre, soft, readily attacked by insects; used only for in-door work and for fuel The fruit is eaten, both raw and pickled. The bark is employed by tanners

Balsamodendron mukul, Hook.; Brand. For. Fl. 64.—*B. Roxburghii*, Dalz & Gibs. Bby. Fl. Suppl. 19. *Gugal.*

Branches frequently ending in a spine. Leaves alternate, generally crowded towards the ends of short branchlets, 1-3-foliolate. Leaflets obovate, toothed towards the apex, almost sessile and shining, the terminal, the largest Flowers small, unisexual, of a reddish colour, 2 or 3 in a fascicle; the male with a short abortive ovary, and the female with sterile imperfect anthers. Calyx tubular, 4 (5) cleft, glandular-hairy. Petals 4-5, strap-shaped, longer than the calyx. Stamens 8-10, inserted on the 8-10-toothed disc. Stigma 2-lobed. Drupe red when ripe, ovoid, apiculate, smooth, containing 2, 2-celled stones.

Found in Khándesh, Deesa, Káthiáwár, Sind, Rájputána, Bellary and Berár.

This small tree attains the height of 4-6 ft. or more. Fl. March-April; sheds its leaves in the cold season, and is covered with them in May.

Wood whitish, even-grained, soft and light, takes a fine polish. This tree exudes a fragrant gum-resin, which is sold in the bázárs under the name of *gugula* or *gugal*, which is believed to be the *bdellium* of old writers; it occurs in brittle tears of various sizes and of a red yellow or brownish colour, with a bitterish balsamic taste, and which probably furnishes part of the myrrh which is sold in Bombay. The *gugal* is said to be collected in the cold season by making incisions in the tree, and letting the resin fall on the ground. This accounts for the dirty condition in which it is imported into this city. The authors of the Bombay Flora, describing a plant from Khándesh under the name of *B. Roxburghii* believed to be *B. mukul*, write:—"The whole plant is aromatic, abounding in a viscid balsamic juice, which is exported in considerable quantities from Oomrawatty."

B. Berryi, Arnott.; Brand. For. Fl. 65.—*Protium Gileadense*, Grah. Cat. Bby. Pl. 43. *Hab-i-balessam, roghan-i-ballessam, aod-i-ballessam.*

A small-sized tree; lateral branches spinescent. Leaves alternate, trifoliolate, 1-1¼ in., on short slender petioles arising from

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very short branchlets. Leaflets obovate-obtuse, obscurely crenulate, glabrous, sessile, the terminal one twice as large as the lateral ones. Flowers subsessile, solitary or fascicled ; peduncle shorter than the petioles. Calyx tubular, 3-4 cleft. Petals 3-4, reflexed, with inflexed tips. Disk small, 6-8 lobed, bearing 6-8 stamens. Stamens alternately shorter. Stigma 4-lobed. Ovary large. Drupe ovoid, pointed.

Native of the dry forests of the Nilghiries and Sivagheri Hills ; cultivated as a hedge plant all over India.

A small tree with a girth of 2-3 ft. Covered with flowers and fruit February-March.

The whole tree has a grateful fragrance, and a gum-resin exudes from its trunk.

B. pubescens, Stochs.; Brand. For. Fl. 65. *Bayi.*

A small tree or shrub with pubescent unarmed branches. Leaves 3-5-foliolate, on slender petioles, downy when young. Leaflets ovate, obovate or orbicular, entire pubescent. Flowers sessile, reddish or white. Stamens all equal. Drupe red, ovoid, with 2 stones.

Native of the rocky parts of Sind and Beluchistan.

Fl. March-April ; covered with leaves April-May.

This tree also yields a tasteless, inodorous gum.

Canarium strictum, Roxb. ; Dalz. & Gibs. Bby. Fl. 52 ; Bedd Fl. Sylv. t. 128. *Gugal-dhup, black-dammar tree.*

A tall straight tree ; young branches, petioles and panicles clothed with dense rusty-tomentum. Leaves 1-4 ft., equally or unequally pinnate. Leaflets 7-15 ; 3-12 by 2-5 in., opposite or subopposite, ovate-oblong, or ovate-lanceolate, acuminate, petioled, more or less crenulate, glabrescent and shining above, more or less tomentose beneath. Flowers white, numerous, in axillary panicles. Calyx campanulate, tomentose, 3-4-fid, valvate, persistent. Petals 3-4, much imbricate, thinly hairy at the apex. Male flowers : disc none. Filaments united below into a tube. Anthers oblong, dorsifixed, dehiscing longitudinally. Ovary small, 6-lobed, densely hairy-tomentose at the apex. Female flowers : ovary glabrous as long as the stout style. Drupe oval 1½-2 in., tapering at both ends, with a hard, bony, 3-celled nut.

This plant is found growing in the Konkan, Mira Hills, Pant Sachu's States, and in various parts of the Madras Presidency. Alt. 4500 ft.

The quality of its wood is not known. This tree is the source of a resinous substance, having a dark appearance and known as black dammar. This dammar is translucent, of a deep reddish-brown colour when held between the eye and the light. It is insoluble in cold, and partially so in boiling alcohol with the addition of camphor; completely soluble in oil of turpentine, and in this state it is used for many purposes, as in the manufacture of bottling wax, varnishes, etc. It is recommended by Dr. Bidie as a substitute for Burgundy pitch.

MELIACEÆ.

Azadirachta Indica, Adr. Juss. ; Dalz. & Gibs. Bby. Fl. 36.— **Melia Indica**, Brand. For. Fl. 67. *Nim, limbro, nimbay, margosa tree.*

Leaves imparipinnate, approximated near the ends of the branches 8-15 in. long. Leaflets 9-15, 1-3 by ½-1½ in., opposite, sub-opposite or alternate, ovate-lanceolate, unequal-sided, oblique or subfalcate, acuminate, serrate, glabrous, very shortly petioluled. Flowers small, white, honey-scented, on short puberulous pedicels arranged in large, solitary, axillary panicles shorter than the leaves. Calyx lobes 5, minute, rounded. Petals 5, shortly ciliate. Staminal tube as long as the petals. Anthers 10 opposite the teeth of staminal tube. Ovary 3-celled. Drupe oblong, size of an olive, yellowish-green. Stone almost always 1-celled; 1-seeded. Timber Trees.

A common tree growing throughout the greater part of India and some parts of Burma; often planted near villages.

Alt. 5000 ft.

It is a large tree attaining the height of 40-50 ft., sometimes to 80 ft. with a girth of 6-9 ft. Fl. March-May; Fr. in the rainy season. Sheds its leaves in the hot season; new leaves appear March-April.

Wood yellowish-white or brownish-red, compact, resembling mahogany, durable, and not attacked by insects on account of its being bitter; takes a fine polish. Used for the construction of carts, agricultural implements, furniture, in house and ship-building, and for making idols. From incisions made in the trunk of young trees, issues a toddy-like fluid, which is used as a stomachic and a cooling drink. The bark is prescribed in the form of decoction in the cure of intermittent fevers; the leaves are applied in the form of a poultice to indolent ulcers. An acrid bitter oil (called *Margosa oil*) is extracted from the pulp of the drupe. The seeds are employed for killing insects and washing the hair. (*See* Oils.)

M. azedarach, Linn.; Brand. For. Fl. 68.—*M. sempervirens*, Dalz. & Gibs. Bby. Fl. Suppl. 15. *Hab-ul-ban* (Arab name used in Bombay), *maha-limbo, Persian lilac, common bead tree, drek, bakayan.*

Young parts and inflorescence minutely puberulous. Leaves 9-18 in. long, bipinnate, occasionally tripinnate, with or without an odd one, opposite, sub-opposite or alternate. Leaflets 1½-3 by ½-1¼ in.; ovate or lanceolate, unequal, acuminate at the apex and more or less oblique at the base, serrate or entire at the upper end, very shortly petioluled. Flowers usually 5-merous, pale lilac, ¼-⅓ in. long, honey-scented, on short, slender pedicels, in solitary, more or less puberulous axillary panicles, shorter than the leaves. Calyx deeply cleft, lobes oblong-lanceolate. Petals puberulous. Staminal tube purple, glabrous outside, many-toothed at the tip. Ovary 5-celled. Stigma 5-furrowed. Drupe sub-globose ½-¾ in. diam., yellow when ripe, with 5 or fewer cells and seeds.

This beautiful tree is commonly cultivated near villages throughout India, but said to grow wild in the Sub-Himalayan tract, some parts of Burma and the Indian Archipelago.

Alt. 2000 to 3000 ft. up to even 5800 ft.

It attains the height of 40-50 ft. with a girth of 6-7 ft. Fl. February March, sometimes throughout the year; Fr. March-April. Sheds its leaves February-April; new leaves at the end of the hot season.

Wood yellowish-white or reddish, loose-grained, soft, light, takes a fine polish; that of old trees is handsomely striate; used for furniture and many other purposes. The seeds are used as beads for rosaries. The bark, leaves and pulp of the fruit, which are bitter, are administered in

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the form of decoction as an anthelmintic. In large doses they are reported to produce narcotic effects. A fixed oil is said to be extracted from the fruit. (*See* Oils.)

M. dubia, Cav.—*M. composita*, Dalz. & Gibs. Bby. Fl. 36; Brand. For. Fl. 69. *Ejsur, limbarra, nimbarra.*

Young shoots, petioles and panicles mealy with stellate hairs. Leaves 9-24 in. long, bi-tripinnate; pinnæ 3-7 foliolate. Leaflets 1-3 by ¼-1½ in., ovate or oblong-lanceolate, acuminate at the apex and somewhat oblique at the base, entire or crenulate, glabrous. Flowers white, odorous, ¼-⅓ in. diam., arranged in panicles. Calyx divisions 5, ovate-oblong. Petals 5, linear-lanceolate. Staminal tube about ¼ in., white, villous. Ovary 5-celled. Drupe ovoid, size of a plum, with 5 or fewer cells and seeds by abortion.

A handsome tree planted and found wild in various parts of the Indian Peninsula, Ceylon, Burma, Indian Archipelago, Australia and Angola. In this Presidency it is found at Parr Ghát, Talwaddi and other hilly parts of the Konkan.

It attains the height of 40-60 ft. and a girth of 4-8 ft. Fl. February-April; Fr. in the cold season.

Wood light, cedar-like, not easily attacked by white ants, but not so strong and durable as that of *M. azadirachta*; used in Ceylon for ceilings and out-riggers of boats. The drupe sold in the bázárs as *kadu khajura* are bitter, and administered in colic and bowel complaints. The seeds are said to taste like almonds.

Dysoxylum binectariferum, Hook.—*Guarea binectarifera*, Grah. Cat. Bby. Fl. 31.—*Epicharis exarillata*, Dalz. & Gibs. Bby. Fl. 37. *Yerindi.*

Leaves 9-18 in. long; petioles flat. Leaflets 5-9, 2½-7 by 1-3 in., alternate, ovate-lanceolate to elliptic-lanceolate, acuminate, unequal at the base, entire, glabrous; petiolules ⅛-⅜ in. long. Flowers 4-merous, pale-green or greenish-yellow, ¾ in. diam., shortly pedicelled, in minutely puberulous panicles. Calyx thick, coriaceous, hemispherical, obsoletely 4-toothed. Petals coriaceous. Staminal tube about 2 lin. long, hairy on both sides. Ovary and style hairy. Capsule 2½ in. diam., brownish-yellow, pear-shaped, size of an apple, 4-celled, 4-seeded, each cell containing a solitary, dark-purple, obovate-oblong, chestnut-sized seed.

Found at Lonávli, Khandála, Vengúrla, Goa and other parts of the Konkan; also on the gháts of the Madras Presidency, Ceylon, Khasia Mountains, Assam and Chittagong.

Alt. 2000 ft.

This evergreen tree attains the height of 30-50 ft., sometimes to 60 ft. Fl. in the rainy season; Fr. in the cold season.

Wood reddish, soft, coarse-grained. Use not known. Monkeys are said to be very fond of the fruit.

Sandoricum Indicum, Cav.; Grah. Cat. Bby. Fl. 31; Hook. Fl. Brit. Ind. i. 553.

This beautiful evergreen tree with ternate leaves, and with fruit of the size of an apple, was introduced into Bombay many years ago, but, I believe, it has disappeared. It is closely allied to the preceding.

Aglaia Roxburghiana, W. & A. Prod.; Bedd. Fl. Sylv. t. 130; An. Gen. 55.

A large tree; all young parts more or less covered with ferruginous tomentum. Leaves pinnate, 3-8 in. long or more; petiole 3 in. long. Leaflets 5, rarely 7 or 3, 2-5 by 1-1½ in., opposite or alternate, obovate-lanceolate or elliptic-oblong, acute, obtuse at the tip, acuminate or slightly cuneate at the base, entire, glabrescent, pale beneath, on small petiolules. Flowers yellow, shortly pedicellate, in rather supra-axillary panicles longer than the leaves. Calyx 5-cleft. Petals 5, imbricate, elliptic-oblong. Fruit globose or pyriform, ¾ in. diam., buff-coloured. 1-seeded.

Found throughout the Southern Konkan and the Madras Presidency, Ceylon, Burma, Singapore, Malacca and the Malaya Islands.
Alt. 6000 ft.
Fl. March-April, sometimes at other seasons; Fr. in the rainy season.
Wood is strong and useful for building purposes.

A. odorata, Lour.; Dalz. & Gibs. Bby. Fl. Suppl. 13.

This shrub or small tree with yellow fragrant flowers arranged in axillary racemes is found in gardens in Bombay.

Amoora rohituka, W. & A. Prod.; Brand. For. Fl. 69.—*Andersonia macrophylla*, Grah. Cat. Bby. Pl. 31. *Rohituka, harim khana.*

Young parts tawny, closely tomentose. Leaves 1-3 ft., coriaceous, glabrous. Leaflets 9-15, 3-9 by 1½-4 in., opposite, oblong or ovate-lanceolate, acuminate at the apex, somewhat unequal at the base, entire, shortly-petioluled. Flowers white or greenish-white, bracteate, sub-sessile, about 4 lin. diam.; male spikes panicled; female simple. Calyx 5-partite. Petals 3, oval. Staminal tube entire, globular. Ovary 3-celled, with 2 superposed ovules in each cell. Capsule smooth, globose, pale-yellow or reddish, 1-1½ in. diam. Seeds oblong, enclosed in a fleshy arillus.

Found at Khandála and all along the Western Gháts, Travancore, and all over India, Ceylon, Tenasserim, Indian Archipelago and the Philippine Islands.
Alt. 3000 ft.
It is a large evergreen tree growing to the height of 50-60 ft., with a straight trunk more than 4 ft. in girth. Fl. in the rainy season; Fr. in the cold season up to March.
Wood is pale or reddish-brown in colour, streaked, close grained, hard, rather heavy, takes a fine polish; valuable for house-building and canoes. In Bengal an oil is extracted from the seeds.

A. cucullata, Roxb.; Dalz. & Gibs. Bby. Fl. 37; Bedd. Fl. Sylv. An. Gen. 55.

Glabrous. Leaves 6-18 in. long, unequally pinnate, alternate. Leaflets 3-13, 3-7 by 1½-2½ in., opposite or sub-opposite, obliquely ovate-oblong, obtuse at both ends, unequally divided by the midrib, entire, glabrous, the terminal leaflet often hooded at the apex. Male and female flowers on separate trees; male flowers: ⅛ in. diam., yellow, 3-merous, in drooping panicles, about as long as the leaves. Bracts caducous, two at the base of the calyx. Stamens 6-8, sessile. Rudiment of the ovary small. Female in few-flowered racemes. Stamens 6-8. Ovary minutely lepidote, 3-celled, with 2 superposed ovules in each cell. Stigma large. Capsule sub-globose, 2½ in. diam., 3-lobed, 3-celled, 3-valved. Seeds 3-4 covered with a bright orange-coloured aril.

Timber Trees.

Found sparingly on Parvar Ghát of this Presidency; also in Lower Bengal, in the Sunderbands, Nepaul Pegu and Tenasserim.

This evergreen tree is of considerable size, and flowers in September.

Wood reddish-brown, strong, close-grained and hard; adapted for house-building, posts, and as firewood.

A. Lawii, Benth. & Hook. Gen. Pl.—*Epicharis exarillata*, Grah. Cat. Bby. Pl. 31 —*Nemedra Nimmonii*, Dalz. & Gibs. Bby. Fl. 37. *Burumb*.

A middling-sized tree all the young parts and inflorescence covered with yellowish-brown scales Leaves unequally pinnate, 6-9 in. Leaflets 3-5 by 1½-2 in, alternate or opposite, lanceolate or elliptic-lanceolate, acuminate, narrow at the base, glabrous; petioles ⅛-½ in. Flowers very small, white, forming much-branched axillary panicles. Calyx 4-toothed, scaly Petals 4. Anthers 8, rarely 7; staminal tube orbicular, sub-entire or crenated. Ovary lepidote, 3-celled, with 1 ovule in each cell Fruit 1 in. long, pyriform, 3-valved, abounding in white resinous juice.

Found in this Presidency at Khandala, hills near Nágotna, Parr Ghát, forests near Rohe, etc , also in the Madras forests.

Fl. December-January

The quality of the wood is not known.

Walsura piscidia, Roxb.; Dalz & Gibs. Bby. Fl. 37; Bedd. Fl. Slyv An Gen. 56. *Walsura, wallursi*.

Leaves 2-7 in. long, alternate. Leaflets 1-4 by ¾-1¾ in., elliptic, obtuse, often emarginate, glabrous, shining green above, pale beneath, on short petiolules. Flowers numerous, small, yellowish-white, in small terminal panicles Bracts minute, caducous. Calyx 5-cleft. Petals 5, imbricate. Staminal tube 10-divided; divisions all bifid. Ovary 2-, rarely 3-celled. Berry oblong, shortly tomentose, size of an olive, dark-brown, 1-celled, 1-seeded, indehiscent.

Common at Rám Ghat, Malabár, Travancore, and also in various parts of the Madras Presidency and Ceylon

A small tree Fl in the cold season

Wood is said to be good Used by the natives for various purposes, and the bark to intoxicate fish, and the fish thus caught is not unwholesome. This tree is often found stripped of its bark in Southern India.

Heynea trijuga, Roxb.; Dalz & Gibs. Bby. Fl. 38; Brand. For. Fl. 70. *Limbarah*.

Leaves 4-15 in. Leaflets 5-11, 2-6½ by ¾-3 in., opposite, ovate-oblong, acuminate, glabrous above, and whitish, glabrescent or pubescent beneath, on short petiolules, the terminal ones longer. Flowers white, small, numerous, in panicles nearly equalling the leaves. Bracts small, caducous. Calyx 5-cleft, pubescent or subglabrous Petals 5, linear-oblong, glabrous, puberulent. Staminal tube covered with pubescence both internally and externally. Anthers 10, on very short filaments, between two subulate teeth, nearly as long as the anthers. Ovary 2-celled. Capsule ⅓-½ in. long, reddish, round, opening into 2 broad valves. Seed solitary, round, covered with a thin white aril.

Common in Khandála, Parr Ghát and the other gháts of this Presidency; also in the forests of the Konkan southwards, Madras, Bengal, Oude, the Himalayas, Nepaul, Pegu and Penang. Timber Trees.

This is a very ornamental tree attaining sometimes a great height, generally 30 ft. high, with an erect trunk 5 ft. in girth. Fl. February-April; Fr. in the rainy season up to cold season. Sheds its leaves in March.

The quality of the wood is not known. Bark and leaves are bitter.

Swietenia mahogani, Linn.; Brand. For. Fl. 70. *Mahogany.*

A large, evergreen tree, with abruptly pinnate leaves.

It is a native of Central America and West Indies, and has been introduced at Dapuri, Hewra, Calcutta, Sikkim to Sahâranpur. Mr. Woodrow, Superintendent, Botanical Gardens, Ganesh Khind, in a letter addressed to me says: "I have measured many mahogany trees; I find the average of eight years' growth is 20 ft. high and 15 inches circumference at 3 feet from the ground. Much larger trees, forty years old, are at Hewra." The excellent quality of its wood is well known.

Soymida febrifuga, Adr. Juss.; Dalz. & Gibs. Bby. Fl. 38; Brand. For. Fl. 71. *Rohin.*

Leaves abruptly pinnate, 9-18 in. long. Leaflets 6-12, 1½-5 by ⅝-2¾ in., opposite, elliptic or oblong, obtuse at the apex, oblique at the base, on very short petiolules. Flowers greenish-white on short pedicels forming large panicles often equalling the leaves. Calyx deeply 5-cleft. Petals 5, obovate, contorted in bud. Bracts ovate-deltoid, small. Capsule oblong, obovoid, smooth, black when ripe, size of an apple.

Not uncommon in Gujarát, Ajunta, Khándesh and Jawhár forest; also in Madras, Central India, Ceylon and forests of Pegu.

A tree of considerable size 70-80 ft. in height with a trunk 7-8 ft. in girth. Fl. April-May; Fr. in the rainy season. It is almost an evergreen tree; the new leaves appear in the hot season while part of the old ones are still on the tree.

Wood dull-red, close-grained, strong, hard, and durable underground; not being easily attacked by white ants. Much prized for building purposes; ploughshares, pestles and pounders for oil-seeds are made of it. It is well adapted for ornamental furniture and sleepers. The bark is bitter, and used as tonic and febrifuge in cases of intermittent fevers, as well as in diarrhœa and dysentery (*see* Medicines). It is said that this tree is held sacred in some parts of Southern India.

Chickrassia tabularis, Adr. Juss.; Grah. Cat. Bby. Pl. 32.—*C. Nimmonii*, Dalz. & Gibs. Bby. Fl. 38. *Pabba, dalmara, chickrassi* in Beng.

Leaves 12-18 in. long, alternate. Leaflets 10-16, 2-5 by 1¼-2¾ in., sub-opposite or alternate, obliquely ovate, unequal-sided, acuminate-cuspidate, nearly glabrous or more or less tomentose. Flowers numerous, about ⅓-⅜ in. long, of a dirty-white or yellowish-white colour (sometimes red) on terminal axillary panicles which are shorter than the leaves. Calyx 5 dentate. Petals 5, ½ in. long, sparsely pilose. Staminal tube glabrous, and shortly 10 denticulate. Ovary 3-5-celled, hirsute. Capsule nearly 2 in. long, ovoid.

Timber Trees.

Found sparingly on Tungár Hill and Rohe forests in the Konkan; also in the Madras forests, Bengal, Ceylon, Burma and Malacca.

A large tree 60-80 ft. in height and a girth of 8-10 ft. Fl. January-February; Fr. in the hot season.

Wood, known as *Chittagong wood*, is of a light reddish-brown or yellowish-brown colour, close-grained, hard, rather elegantly veined, shining, polishes well; much used for furniture of various kinds and for carving. It has a cedar-like smell, and is called bastard-cedar by Europeans. The flowers yield a yellow dye.

C. velutina, Rœm.

This tree, found in dry situations of the Konkan, appears to be a distinct species; but is united with the last by Mr. Hiern in Hook. Fl. Brit. India. The timber is said to be exported from Malabár.

Cedrela toona, Roxb.; Dalz. & Gibs. Bby. Fl. 38; Brand. For. Fl. 72. *Deodari, kuruk, túndu, tun, tunna, maha-nim.*

Glabrous. Leaves 1-3 ft. long, abruptly pinnate, deciduous. Leaflets 8-30, 2-7 by $\frac{3}{4}$-3 in., generally opposite or sub-opposite, obliquely ovate or lanceolate, acuminate or cuspidate, entire or slightly undulated or serrate, shining above and sometimes glaucescent beneath, on a rather long petiole. Flowers white, fragrant, $\frac{1}{8}$-$\frac{1}{4}$ in. long, on slender, short pedicels, arranged in large drooping, terminal panicles, about the length of the leaves or longer. Calyx segments 5, short, round. Petals 5, oblong, ciliate. Stamens 5, occasionally 6, alternating with staminodes, inserted on orange-coloured, hairy lobes of the disc. Ovary 5-celled, with 8-10 ovules in 2 series in each cell. Capsule oblong, about $\frac{3}{4}$-1 in. long. Seeds compressed, winged below or at both ends.

Found in ravines at Khandála, in the forests of the Southern Konkan and in those of Madras; also in the hilly districts of Central India, tropical Himalaya, Burma, Java and Australia.

Alt. 7000 ft.

A tall tree attaining the height of 60-80 ft. or more under favourable circumstances, and 6-12 ft. in girth. Fl. March-May; Fr. September-November. Sheds its leaves in the hot season.

Wood reddish-brown or of a light-rose colour, with a silvery lustre; soft, even-grained, durable, not attacked by white ants, easily worked, polishes well, and somewhat fragrant when sawn. Much used in making chairs, bedsteads and other articles of furniture; also for door panels and carving work. The bark is a powerful astringent, and is used in diarrhœa and dysentery; its powder mixed with the powdered seeds of *Cæsalpinia bonducella* is administered in the cure of intermittent and remittent fevers. The flowers are used in Mysore in dyeing cotton a beautiful rose colour.

Chloroxylon Swietenia, D. C. Prod.; Dalz. & Gibs Bby. Fl. 39; Brand. For. Fl. 74, *Bhería, halda, billu, satin-wood tree.*

Young parts, petioles and inflorescence covered with minute grey pubescence. Leaves abruptly pinnate, 5-9 in. long. Leaflets 20-40, $\frac{3}{8}$-$1\frac{1}{2}$ by $\frac{1}{4}$-$\frac{1}{8}$ in., opposite, sub-opposite or alternate, unequal-sided, obliquely oblong, obtuse at the apex, glabrous on both sides, pale and dotted on the under surface, shortly petiolulate. Flowers white, $\frac{1}{4}$ in. diam., on long villous pedicels, forming large, branched,

terminal and axillary panicles. Calyx lobes 5, ovate, acute. Petals 5, free from the base, membranous. Stamens 10, filaments free, inserted in the sinuses of the disc Ovary 3-celled, with 8 ovules in each cell, superposed in 2 series. Capsule 1 by ½ in., oblong, dark-brown, glabrous. Timber Trees.

Common in the Konkan and the Deccan, hilly parts of Madras and Ceylon.

A middling-sized tree Fl March April, Fr in the rainy season 'New leaves appear at the end of the hot season, about the time that the old ones fall.

Wood yellowish brown, close grained, hard, heavy, durable, polishes well, fragrant, and has a beautiful satin lustre Much used for furniture and picture frames, ploughs, axle trees, oil presses, etc.; well adapted for turning. The tree is said to yield a wood oil.

CHAILLETIACEÆ

Chailletia gelonioides, Hook; Bedd. Fl. Sylv. An. Gen. 59. —*Moacurra gelonioides,* Dalz. & Gibs Bby. Fl. 52. *Moacurra* in Beng.

Leaves 2-4 by ¾-2 in., while young silky pubescence beneath, alternate, elliptic or elliptic-lanceolate or obovate, abruptly acuminate, short-petioled. Flowers numerous, small, on axillary cymes; male flowers about ⅛ in diam. Sepals 5, obtuse, whitish. Petals as long, narrow, obovate. Hypogynous glands 5, sub-quadrate, opposite to the petals Anthers with broad connective. Female flowers as in the male, but the anthers sterile Ovary broad, compressed, downy, 2-celled, with 2 pendulous ovules in each. Styles 2, very short, recurved. Stigma capitate. Capsule transversely oval, 2-lobed, compressed, ¾-1 in. diam, covered with a grey down, dehiscing along the edges, showing inside yellowish-red arillus. Seeds oblong.

Common at Rám Ghát, Southern Konkan, forests of Madras, Eastern Bengal, Silhet, Ceylon and Chittagong

It is a small, evergreen tree Fl. April-May, Fr. December.

OLACINEÆ.

Gomphandra axillaris, Wallich, Bedd. Fl. Sylv. An. Gen. 61.—*Platea axillaris,* Dalz & Gibs. Bby. Fl. 28.

Diœcious or polygamous, glabrous, or the young branches slightly puberulous. Leaves 2½-5½ by 1-2½ in, alternate, membranous, conspicuously veined, variable in shape, from narrow-lanceolate to almost orbicular, terminating in a long acumination, on a petiole ¼-½ in. Cymes puberulous, axillary, short, solitary or twin, many-flowered in the male; 2-5 flowered in the female. Calyx minute, 4-5-toothed. Petals 4-5, united at the base into a tubular, campanulate corolla. Filaments flat, 4-5, hairy at the apex. Ovary oblong, smooth. Fruit ½ in long, oblong, obtuse, smooth. Seeds large.

Common in the forests of Southern Konkan, Chorla and Parvar Gháts, etc., and those of Madras; also in Silhet and Ceylon.

This is a small tree. Fl. April-May; Fr December.

Strombosia Ceylanica, Gardn.—*Sphærocarya leprosa,* Dalz., & Gibs. Bby. Fl. 223.

Timber Trees.

A tall shrub or middling-sized tree. Leaves 6 by 2¼ in., ovate, oblong-lanceolate, acute or acuminate at the apex, rounded at the base, entire, glabrous, pale beneath, coriaceous, on a petiole ¼ in. Flowers small, green, sub-sessile, in axillary glomerules or on a prominent tubercle. Calyx 5-fid; segments semi-orbicular. Petals 5, three times longer than calyx-lobes, linear-acute. Stamens 5; filaments opposite and adnate to petals. Ovary 4-5-celled with 1 ovule in each cell. Fruit pyriform, nearly 1 in. long, rugose or tuberculated, purple, covered with scurfy scales.

Konkan, Vádi, Goa, Kánara and Ceylon.
Alt. 3000 ft.
Fl. in the cold season; Fr. in the hot season.
Wood white and durable.

Mappia oblonga, Miers; Dalz. & Gibs. Bby. Fl. 28. *Ganerah, gura* (at Mahábaleshvar), *narik.*

Leaves 4-7 by 2¼-3 in., elliptic-oblong, acuminate at the apex, acute at the base, distinctly veined, glabrous on a petiole 1-1¾ in. Flowers yellowish-white, small, very fœtid, pilose, on short pedicels, arranged in terminal, lax, pubescent cymes. Calyx segments 5. Petals 5. Stamens equal in number, alternate with petals. Ovary 1-celled, with 2 pendulous ovules. Fruit ¾ in. ovoid, succulent, purple when ripe.

Common on the gháts opposite Goa; at Mahábaleshvar, Travancore and Ceylon.
Alt. 7000 ft.
It is a middling-sized tree. Fl. in the cold season; Fr. in the hot season.

ILICINEÆ.

Ilex Malabarica, Bedd. Fl. Sylv. t. 143.—*I. Wightiana.*

Glabrous. Leaves variable in length and breadth, usually 4-5 by 1-1½ in., ovate-elliptic or elliptic-acuminate, entire, coriaceous, shining green above, pale beneath on a small petiole, which is channelled above. Flowers $\frac{1}{10}$ in diam., white, usually 6-merous. Peduncles and pedicels puberulous. Male flowers in small umbellules. Female flowers solitary or fascicled; fascicles very shortly peduncled; pedicels ¼-½ in., 3-4 together, rarely solitary. Calyx lobes broad, sub-acute, shortly ciliate. Petals connate at the base. Stamens often only 4, inserted at the base of the corolla; filaments short. Ovary of the male flower imperfect, with 4 minute stigmas. Ovary of the female 6-celled, with 1 ovule in each. Fruit size of a pea, depresso-globose, red when ripe.

Common on the gháts from the Konkan southwards.
Alt. 3000 ft.
A large tree, with a trunk attaining sometimes more than 10 ft. in circumference. Fl. February-April, and probably more or less all the year round; Fr. in the rainy season.
Wood yellowish-white; much used for planks, platters, building purposes, etc.

CELASTRINEÆ.

Euonymus Indicus, Heyne.—*E. Goughii,* Dalz. & Gibs. Bby. Fl. 47; Bedd. Fl. Sylv. An. Gen. 43.

A shrub or small tree, glabrous. Leaves 3-4 by 1-2¼ in., ovate, or oblong, acute at both ends, or shortly acuminate at the apex,

3-nerved, entire or obscurely serrate towards the apex, shortly-petioled. Peduncles axillary, ¼-2 in. long, 1-3 flowered. Flowers pentamerous, reddish-coloured. Petals orbicular, fringed, about ¼ in. broad, imbricated at the margin. Ovary imbedded in the disc, 5-celled, with 2 ovules in each cell. Fruit ¾ in. long, obovoid, clavate, 5-angled. Timber Trees.

This very beautiful tree is not uncommon in the forests of the Konkan and of the Madras Presidency.

Lophopetalum Wightianum, Arn.; Dalz. & Gibs. Bby. Fl. 48; Bedd. Fl. Sylv. t. 145. *Bolpale* in Kan.

Leaves 5-9 by 2-4 in., elliptic-oblong, obtuse or slightly acute at the apex, obtuse or sub-cordate at the base, coriaceous, quite entire, glabrous on both sides on a petiole about ½ in. Flowers pentamerous, of a dull-red colour, 7-9 lin. diam., in axillary and terminal cymes. Calyx lobes very short and broad. Petals with a membranous corrugated crest. Ovary 3-celled. Fruit sharply triangular, 3-celled, 3-4 in. long. Seeds numerous, imbricate, oblong, compressed, with a long wing.

This handsome, large, evergreen tree grows sometimes to a great height; and is not uncommon in the forests of the Konkan and Malabár.
Wood reddish-coloured, hard, close-grained; said to be much used by the natives for house-building.

Elæodendron glaucum, Pers.—*E. Roxburghii*, Dalz. & Gibs. Bby. Fl. 48; Brand. For. Fl. 82. *Tamruj, aran.*

Leaves 2-6 by ¾-2½ in., opposite, elliptic-ovate or oblong, acute or acuminate, crenate or nearly entire, membranous or coriaceous, glaucous when young, on petiole ¼-1 in. Flowers small, pentamerous, yellowish or greenish-white on axillary, diffuse, dichotomous cymes, about half the length of the leaves; peduncles longer than the petioles. Drupe hard, woody, ovoid or obovoid, ½ in. long, 1-celled, 1-seeded.

In this Presidency it is common at Sátára, Camatki, Bhímáshankar forests, etc., and also throughout the hotter parts of India, Ceylon and the Malayan Archipelago.
A small tree, grows sometimes to a great height; in favourable circumstances it attains a height of 30-50 ft., with a girth of 3-8 ft. Fl. February-June; Fr. in the rainy season, and continues to remain on the tree till February and March of the following year. The old leaves are shed February-March, and new ones appear in May.
Wood light reddish-brown, close and even-grained, tough, but not very strong, durable, works easily and polishes well; the surface is often beautifully curled; used for cabinet-work and manufacture of combs; adapted for picture frames. The root and bark are used in native medicine; the latter is said to be a virulent poison, while the former as a specific for snake-bites.

RHAMNACEÆ.

Zizyphus jujuba, Lamk.; Dalz. & Gibs. Bby. Fl. 49; Brand. For. Fl. 86.

This is the well-known *Bhor* or *Baer* tree; wild and cultivated throughout India, as far as the base of the Himalayas; also in Ceylon,

Timber Trees.

Burma, Malacca, Malayan Archipelago, China, Australia and tropical Africa.

This is a middling-sized tree, attaining sometimes the height of 25-40 ft. or more, with 4-8 ft. in girth. Fl. in the rainy season; Fr. December-March.

Wood yellowish when freshly cut, becoming dark-brown in time, hard, strong, durable, close and fine-grained; used for building purposes, agricultural implements, Persian wheels, tent-pegs, oil-mills and for many other purposes; yields a good charcoal. Lac is found on it in various parts of India; a kind of gum exudes from its bark which is used in native medicine; while the bark is used by tanners. It is said that wild silkworms live on this tree at Kangra and in Southern India. Oil is abstracted from its kernel. Leaves are used as cattle fodder. The fruit is eaten by all classes of people; that of the cultivated tree is larger, ovoid or oblong; of the wild, globose. The pulp is mealy and sweet.

Z. xylocarpus, Willd.; Dalz. & Gibs. Bby. Fl. 49; Brand. For. Fl. 90. *Guti, goti, bhore-goti.*

Branches, underside of leaves, inflorescence and fruit covered with short greyish tomentum; stipulary thorns generally twin, one straight and the other recurved, always present in a poor soil, but often absent in a good one, and especially on younger branches. Leaves 1½-3½ in. long by nearly as broad, elliptic, orbicular or obovate, obtuse at the apex, slightly oblique, rounded or sub-cordate at the base, serrulate, glabrous and dark above, pale and softly pubescent below, shortly petioled. Flowers greenish-yellow, sometimes tetramerous, on short pedunculate compact cymes 1-1½ in. long. Calyx glabrous within; lobes keeled near the apex. Petals very concave, reflexed, on long claws. Disc thin, 5-angled. Ovary 3-, rarely 2 or 4-celled. Styles usually 3, divided to near the base. Drupe usually round, hard, 3-, rarely 2 or 4-celled, ½-1 in. long, covered with a dense grey or whitish tomentum.

Common in almost every forest of this Presidency and in that of Madras, North-West India, Rájputána, Oude, Nepaul and Ceylon.

Alt. 2000 ft.

Attains the height of 15-20 ft. and a girth of 2-3 ft. Fl. April-May; Fr. September-February. Old leaves are shed February-March, new ones appear April-May.

Wood yellowish-white or orange-coloured, hard, tough and durable; employed for building purposes, for carts, ploughs, etc.; excellent torches are made of it. Bark is employed for tanning and for making blacking; the fruit is also used for making blacking for leather, and the kernel is edible. The young shoots, leaves and fruits are used as fodder for cattle and goats.

SAPINDACEÆ.

Hemigyrosa canescens, Thwaites; *Cupania canescens*, Grah. Cat. Bby. Pl. 29; Dalz. & Gibs. Bby. Fl. 35. *Kurpah, karpa, kalu, yetti* in Kán.

Young parts shortly greyish tomentose. Leaves 5-20 in. long. Leaflets 2-8, 2½-10 by ¾-5 in., mostly opposite, elliptic-oblong, ovate, obovate or lanceolate, generally obtuse or emarginate or acute at the apex, entire, coriaceous, glabrous, shining, on a short, thick, puberulous petiolule. Flowers white, ⅛-¼ in. diam., in

racemes simple or panicled, axillary or from the leafless branches. Sepals 4, silvery-canescent. Petals 4, furnished with bifid scales at the base. Bracteoles mostly subulate. Ovary 3-celled, with a solitary ovule in each cell. Fruit fleshy, sub-globose or 3-gonous, tomentose, ½-1 in. diam., often 1-seeded by abortion. Timber Tree

Common in the Konkan, Rám Ghát, Kussar Ghát, Khandála, Bhímáshankar; also on the western side of the Madras Presidency, Ceylon, Burma, etc.

An evergreen, middling-sized tree with a trunk of considerable thickness, but not straight. Fl. February-April; Fr. end of the hot season or the beginning of the rainy season

Wood whitish, soft, even-grained, not strong, but used by the natives for building purposes.

Schleichera trijuga, Willd.; Dalz. & Gibs. Bby. Fl. 35; Brand. For. Fl. 105. *Kassumar, kussimb, kussumb, peduman.*

Young parts puberulous. Leaves abruptly pinnate, 8-16 in., at the ends of branches. Leaflets 4-8, 1-10 by ⅜-4¼ in., opposite or sub-opposite, oblong, elliptic-oblong or nearly lanceolate, the lowest pairs the smallest, obtuse or shortly acuminate, entire, coriaceous, sessile. Flowers small, yellowish-white or greenish, on short pedicels, arranged in axillary, branched racemes. Fruit ¾-1 in. long, smooth, ovoid, unarmed or sometimes echinate.

Common in this and the Madras Presidencies, Bengal, Central India, Ceylon and Burma.

Alt. 3000 ft.

A large beautiful tree attaining sometimes the height of 60-70 ft. and a girth of 8-12 ft. Fl. February March, when it is covered with young leaves; leafless in the cold season.

Wood red or reddish-brown, very heavy, strong, hard, tough, close-grained, durable, and takes a fine polish. Used in making rice and sugar-pounders, pestles and mortars; for building and many other purposes. Lac is produced on the tree; that found at Mirzapore is said to be the best. The pulpy sub-acid aril is eaten. Oil is extracted from the fruit. Bark is rubbed with oil to cure itch.

Sapindus laurifolius, Vahl.; Dalz. & Gibs. Bby. Fl. 34 Brand. For. Fl. 106. *Rhitah.*

Leaves 8-14 in. long, pari-pinnate, alternate. Leaflets 4-6, 3½-7½ by 1¼-3 in., ovate or oblong-lanceolate, acuminate at the apex, sometimes obliquely-sided at the base, entire, glabrous, shining above, soft pubescent beneath, on petiole 2-3 lin. Flowers numerous, small, dull-whitish, in large, terminal, much-branched panicles, which are clothed with rusty pubescence. Calyx rusty pubescent on the outside. Petals covered externally with adpressed hairs, sometimes furnished on inner surface with a membranous scale, fringed with long white hairs. Fruit fleshy, 3-lobed, soft when ripe, of a brownish colour. Seed round, obovate.

Common in Bombay and Madras, both wild and cultivated.

This handsome tree has a straight trunk with 3-4 ft. in circumference. Fl. November-December; Fr. February-April.

Wood light-yellowish, close-grained, hard, but not durable; used for door frames, posts, etc. The fruit is used medicinally and also as soap

Timber Trees.

for washing clothes, silk, etc. It is said to be efficacious in epilepsy; an oil is also said to be extracted from the nuts.

In Hooker's Flora of British India *S. emarginatus* is describde as a variety of *S. laurifolius*; the former is common in Gujarát, and is also found, though scarce, in the Deccan; both trees are known by the same name *Rhitah*, and the uses are the same.

Nephelium longana, Camb.; Grah. Cat. Bby. Pl. 29; Dalz. & Gibs. Bby. Fl. 35. *Wumb.*

Glabrous. Leaves 4-18 in. long. Leaflets 4-10, 2-12 by ½-2½ in., opposite or alternate, elliptic-oblong or ovate-lanceolate, obtuse or acute at the apex, and sometimes oblique at the base, entire, coriaceous, glabrous above, more or less glaucous beneath on small petiolules; veins prominent. Flowers pale, yellowish-white, ⅛-¼ in. diam., on short pedicels arranged in terminal and axillary, puberulent panicles. Calyx deeply 5-, rarely 6-partite, softly downy on both sides. Petals 5, rarely 6 pubescent, spathulate. Stamens 6-10; filaments tomentose. Ovary 2-3-lobed, tomentose. Style with 2-3 stigmatic lobes. Fruit lobes usually solitary, rarely 2-3, reddish or purple, globose, ½-¾ in. diam., tubercled.

Common at Parr and Rám Ghát, and from the Konkan southwards; also in Eastern Bengal, Ceylon and Pegu.

A beautiful evergreen tree 30-50 ft. high and 4-5 ft. in girth. Fl. February-March; Fr. in the rainy season.

Wood light or reddish-brown, rather heavy, hard, close-grained, takes a fine polish; adapted for furniture. The succulent aril of the seed is an agreeable acid substance, which is eaten by the natives.

N. litchi, Camb.; Grah. Cat. Bby. Pl. 29; Dalz. & Gibs. Bby. Fl. Suppl. 13. *Litchi.*

Leaves 3-9 in. long, usually abruptly pinnate; leaflets 2-8, 1½-6 by ½-1¾ in., opposite or alternate, oblong-lanceolate or ovate, acuminate, entire, coriaceous, glabrous, glossy above, glaucous, glabrous or glabrescent beneath on short petiolules. Flowers greenish-white, shortly pedicelled, $\frac{1}{12}$-⅛ in. diam., arranged in tawny tomentose, terminal panicles, as long as or longer than the leaves. Calyx 4-, rarely 5-lobed, puberulous on both sides. Petals none. Stamens 6-8; filaments hairy. Disc glabrous, crenulate, fleshy. Ovary 2-3-celled, covered with ferruginous tomentum. Style generally with 2 stigmatic lobes, sometimes with 3. Fruit 1-2-lobed, globose, size of a pigeon's egg, red, tubercled. Aril whitish, fleshy, sub-acid.

Very common in gardens in Bombay; cultivated throughout India.

This ornamental, evergreen tree attains the height of 30-40 ft. and a girth of 3-4 ft. Fl. February-March; Fr. in the rainy season.

Wood red-brown, heavy, hard, close grained, and takes a fine polish; adapted for furniture. The sweet fruit is eaten.

I have seen only one plant of *Blighia sapida*, the *aki* tree, in Bombay.

Sapindus rubiginosus, which was introduced into Bombay from Calcutta, has, I believe, disappeared.

Harpullia cupanioides, Roxb.

Said to exist in Southern Konkan, but this requires confirmation.

SABIACEÆ.

Meliosma Wightii, Planch., *Hill mango.*—*M. pungens,* Brand. For. Fl. 116.

This plant is said to exist in the Konkan.

ANACARDIACEÆ.

Mangifera Indica, Linn. *Am, amb,* or *amba;* the well-known *mango tree.*

Common every where.
Alt. 3500 ft.

In some places it attains the height of 60-70 ft. with a straight trunk, measuring 15 ft. in circumference. Almost an evergreen tree; Fl. February-March; Fr. May-June.

Wood dirty white or dull-grey, soft, coarsely fibrous, open-grained, readily attacked by insects, or soon decays if exposed to wet; heart wood of old trees is dark-brown, close-grained and more durable; used for house and coach-building, packing cases, door and window frames. Canoes are occasionally made of it. Bark exudes a yellowish gum. The tree is mainly cultivated for the sake of its delicious fruit. The unripe fruit is pickled and sometimes cut into pieces, salted, and dried in the sun to be used in curries. (*See* Oils.)

Anacardium occidentale, Linn.

This is also the well-known *caju* or *cashew-nut* tree, found all along the coast of India and Ceylon.

An evergreen tree, growing to the height of 25-30 ft. and a girth of 2-3 ft. Fl. December-February; Fr. March-April.

Wood dark-brown or red in colour, hard, close-grained; occasionally used for making packing cases and boats; also makes an excellent charcoal. The enlarged pedicel of the fruit is eaten, and from its juice large quantity of spirit is distilled in Southern Konkan. From the trunk there exudes a transparent gum, resembling gum-arabic, which makes a good varnish; a solution of this is used in book-binding to keep off insects (*See* Oils.)

Buchanania latifolia, Roxb.; Dalz. & Gibs. Bby. Fl. 52; Brand. For. Fl. 127. *Pyal, char, charuli*; the kernel of the fruit is called *chironji.*

Leaves 6-10 by 3-4½ in., rounded or obtuse at the tip, coriaceous, firm, entire, 15-20 pairs of prominent nerves, villous or pubescent, glabrate beneath, on a flattened, stout, pubescent petiole ¼-½ in. Flowers numerous, greenish-white, ¼ in. diam., sessile or on very short pedicels, forming terminal and axillary, wooly or velvety, much-branched panicles; bracts small, caducous. Calyx small, 5-toothed. Petals oblong. Disc fleshy, 10-lobed. Stamens 10. Ovary 1 fertile, conical, hairy; the remaining 4 reduced to filaments. Drupe compressed, smooth, sub-globose, black when ripe, ½ in. long. Nut hard, bony, 2-valved.

Common all over the Konkan as far as Baroda; also in Central India, Oude, Burma, etc.
Alt. 1500-4000 ft.

This tree grows to the height of 40-50 ft. with a straight trunk attaining a circumference of 4 ft. Fl. January-March; Fr. April-May. Sheds its leaves in the hot season.

Timber Trees.

Wood greyish-brown or red, soft, even-grained, tough, easily worked, but liable to be attacked by white ants; but durable if kept dry. Used for making bullock yokes, doors and window frames, boxes, etc.; also for making charcoal. The bark is used for tanning, and from its wounds exudes a transparent gum. Both the fruit, which has a sweetish taste, and the kernel are eaten; the latter is employed in native confectionery. (*See* Oils.)

Odina Wodier, Roxb.; Dalz. & Gibs. Bby. Fl. 51; Brand. For. Fl. 123. *Shimti, ginyan, kimul, moina, moi, moja.*

Young parts and inflorescence covered with stellate tomentum. Leaves 12-18 in., unequally pinnated near the ends of branches. Leaflets 7-9, 2-6 by ½ in., oblong-ovate, caudate-acuminate, entire, membranous, glabrous, sub-sessile, the terminal one long petiolulate. Racemes slender; male: compound, long; female: simple and short. Flowers tetramerous, purplish or greenish-yellow, on short pedicels. Bracts ciliate. Sepals obtuse, ciliate. Petals twice as long, oblong, coriaceous, spreading. Stamens 8, in male flowers as long as the petals. Drupe kidney-shaped, red or purple when ripe, size of a pea.

Very common in this Presidency, in Madras, Bengal, along the foot of the Himalayas, Ceylon, Assam, Tenasserim and the Andaman Islands. Alt. 4000 ft.

This tree grows 40-50 ft. in height and 5-8 ft. in girth. Fl. February-March; Fr. in the hot season; remains leafless almost from February to end of hot season.

Sap-wood white, rather light and coarse; heart-wood heavier, close-grained, of a dull-red colour, or reddish-brown on exposure. Used for scabbards, spear shafts, oil-presses and for many other purposes. It works and polishes well, and is, therefore, well adapted for furniture and cabinet purposes. A yellowish white gum exudes from the trunk, which is used in cloth-printing by weavers, and in medicine, being given in asthma, and applied externally as a plaster in rheumatism, etc. The bark is said to be good for tanning. Leaves and young shoots afford good fodder for cattle.

Semecarpus anacardium, Dalz. & Gibs. Bby. Fl. 52; Brand. For. Fl. 124. *Bibu, biba, bhilama, bhilawa, marking-nut tree.*

Diœcious; young branches, inflorescence, petioles and the underside of leaves covered with a short, pale pubescence. Leaves 9-18 by 5-12 in., approximated near the ends of branches, oblong or obovate-oblong, rarely linear-oblong, usually contracted below the middle, rounded at the top; rounded, cordate or cuneate at the base, thick-coriaceous, on rounded, thick petiole 1-2 in.; nerves 16-25 pairs, conspicuous. Flowers greenish-white or yellow, ¼-⅓ in. diam., sub-sessile, fascicled, arranged in erect, large, terminal panicles as long as the leaves or shorter; bracts lanceolate. Petals 3-4 times the length of the calyx, spreading, glabrous. Stamens 5; filaments slender. Ovary densely tomentose. Styles 3. Drupe obliquely oval or oblong, smooth, shining, purplish black; cup-shaped hypocarp, orange-red, fleshy.

Common in Gujarát, the Deccan and the Konkan, Madras, tropical Himalayas from Sirmore to Sikkim, Assam, Eastern Archipelago and South Australia.

Alt. 3500 ft.

This tree attains 30-40 ft. in height, trunk erect, 4 ft. in circumference. Fl. generally in the hot season; Fr. in the cold season. Leaves shed in February; new ones appear in May. Timber Trees.

Wood grey, reddish-white or brown, open-grained, soft, not durable, useless. It is full of an acrid juice which causes inflammation of the skin. The fleshy orange-red receptacle is roasted and eaten, and said to taste somewhat like roasted apples, and when dried somewhat like dates; the kernels are also eaten. The pericarp contains much corrosive juice, which is used for marking cotton, and applied externally as a counter-irritant in internal inflammation and rheumatism. The juice is generally mixed with lime water before it is used for marking linen. The oil of the seeds mixed with the milk of an Euphorbiaceous plant and the young fruit well pounded, is made into bird-lime. The bark is employed in dyeing; it exudes a sort of white gum.

Holigarna Arnottiana, Hook.—*H. longifolia*, Grah. Cat. Bby. Pl. 41; Dalz. & Gibs. Bby. Fl. 51. *Hulgeri*, also called *bibu*.

Young shoots pubescent. Leaves 6-9 by 2-3 in., about the ends of branches, more or less spathulate or cuneate-ovate or oblong, obtuse or acute, gradually narrowed down to the petiole, entire, coriaceous, shining above, glaucous or not beneath; nerves 16-20 pairs, strong, slightly arcuate, conspicuous on both surfaces; petiole glabrous or rufo-pubescent, ¼-1 in., with 2 tubercles on the top, furnished about the middle with two subulate, spur-like, deciduous processes. Panicles of compound racemes axillary and terminal, densely rufo-tomentose; male and female on different trees. Flowers numerous, dull-white, minute; male flowers smaller than the fertile. Calyx 5-toothed. Petals 5, villous, cohering at their sides with margin of the disc. Stamens 5, inserted round the margin of the disc. Drupe obliquely oblong, rounded at the top, about 1 in. long.

Common on the ghâts of the Konkan and of the Madras Presidency.

This tree grows to the height of 30-50 ft., with a trunk of 3-5 ft. in circumference. It is an evergreen tree; Fl. February-March; Fr. April-May.

Wood grey or yellowish-brown, close-grained, but soft. It is stated that in some parts it is used for house and boat-building. A very acrid black substance is prepared from the trunk and fruit, which is used as varnish. The fruit and bark are used medicinally. (*See* Oils.)

H. Grahamii, Hook.—*Semecarpus Grahamii*, Dalz. & Gibs. Bby. Fl. 52; Bedd. Fl. Sylv. An. Gen. 79.

Young parts pubescent. Leaves 1-2 ft. by 4-6 in. broad a little below the apex, gradually tapering down to the base from a little above the middle, spathulate or oblanceolate-cuneate, acuminate, rigidly coriaceous, shining and sometimes glabrous above, pale and hairy beneath; nerves 20-30 pairs, very prominent beneath, on petiole ½ in.; spur-like, deciduous processes 2 or 4. Panicles racemose, terminal; male: 1 ft. long, much-branched, rufo-tomentose; female: short. Flowers numerous, dull-white, minute; male about 1 in. diam. Calyx cup-shaped, truncated. Styles 3, reflexed. Ovary covered with rust-coloured hairs. Drupe ovoid, glabrous, ¾ in. long.

Common in the jungles of the Konkan.

A deciduous tree with a height of 20-30 ft., and 2-3 ft. in girth. Fl. December-February; Fr. April-May.

Timber Trees.

The wood is not known to be used for any purpose; but a black, acrid, oily substance is extracted from the pericarp of the fruit and used for the same purpose as that of the last species.

Nothopegia Colebrookiana, Blume.—*Glycycarpus racemosus,* Dalz. & Gibs. Bby. Fl. 51. *Amberi.*

A tree with milky acrid juice.; branches glabrous. Leaves 2-8 by 1-2½ in., alternate, elliptic-oblong, or oblong-lanceolate, acuminate, usually waved, entire, coriaceous, glabrous, shining above and glaucous beneath; nerves 15-20 pairs, arched, not prominent; petiole ½-¾ in., naked. Racemes axillary or from the axils of fallen leaves, much shorter than the leaves, solitary and fascicled; male: branched, much longer and more branched than the female. Flowers small, numerous, white. Sepals almost orbicular. Petals linear-oblong, with recurved tips, hairy on the back. Stamens 4. Ovary ovoid, 1-celled, with one pendulous ovule. Style undivided; stigma simple. Drupe transversely oblong, ¼ in. diam., depressed, red when ripe. Seed 1, covered with sweet pulp.

Common on the ghát forests of this Presidency and those of Madras; also in Ceylon.

Alt. 3000 ft.

It is a small tree about 15 ft. high.

The sweet oil is eaten.

Spondias mangifera, Pers.; Dalz. & Gibs. Bby. Fl. Suppl. 19; Brand. For. Fl. 128. *Ambarah, amarah, amrah, rhan-amb, hog-plum.*

Glabrous. Leaves alternate, 1-1½ ft. long, imparipinnate, on slender terete petioles. Leaflets 9-13, 2-9 by 1-4 in., opposite, elliptic-oblong, acuminate, more or less oblique at the base, quite entire, glabrous, membranous, shining, shortly petiolulate; nerves 10-30 pairs, horizontal, prominent, joined by a conspicuous intramarginal one. Flowers ¼ in. diam., scattered, greenish-white, uni- or bisexual, sub-sessile, arranged on large, terminal, much-branched panicles. Calyx 5-toothed. Petals 5, oblong. Disc large, fleshy, 10-crenate. Stamens 10; filaments subulate. Drupe ½-2 in. long, ovoid, smooth, yellow. Stone woody, tough and rough, with small cavities, usually with 1-3 perfect seeds.

Common all over India, Ceylon, Malacca and tropical Africa.

Alt. 5000 ft.

A small tree about 20 ft. high and 4 ft. in circumference; in favourable circumstances it grows to the height of 50-60 ft., or even more. Fl. April; Fr. in the cold season. Sheds its leaves in the cold season.

Wood white, soft, coarse and useless. From wounds made in the bark, large quantities of an insipid yellowish gum exude resembling somewhat gum-arabic. The raw fruit is pickled, and the ripe one has an austere, acid, somewhat sweet taste, but is nevertheless eaten. Leaves when bruised emit a peculiar smell.

S. acuminata, Roxb.; Grah. Cat. Bby. Pl. 42. *Ambat, ambadah.*

Leaves smaller than those of the last. Leaflets 11-17, 1½-3 in. long, sub-opposite, long-acuminate, quite entire or obscurely and remotely crenulate, shining. Flowers greenish-white on panicles

6-8 in. long. Calyx-lobes imbricate, small. Petals spreading. Disc crenate. Stamens 10. Ovary sessile, free, with a solitary, pendulous ovule in each cell. Drupe ovoid-globose, size of a small hen's egg. Stone smooth, fibrous. Timber Trees.

Grows in the Konkan and Malabár.
This is a beautiful tree of middling size and with an erect trunk. Fr. January.

MORINGEÆ.

Moringa pterygosperma, Gærtn.; Dalz. & Gibs. Bby. Fl. 311; Brand. For. Fl. 129. *Shektah, soanjna, sainjan, moshing, horse-radish* tree of India.

Young parts tomentose. Leaves 1-2 ft. long, alternate, twice or usually thrice pinnate; petiole sheathing at the base; pinnæ 4-6 pairs. Pinnulæ 6-9 pairs, opposite, elliptic, ovate, or obovate; on slender petiolules; glands between each pair of pinnæ. Flowers 1 in. diam., white, honey-scented, arranged in panicles spreading at the ends of branches. Bracts linear. Sepals linear-lanceolate. Petals linear-spathulate. Fertile filaments hairy at the base. Ovary villous. Pod 9-18 in., pendulous, with 9 longitudinal ribs. Seeds 3-gonous, winged at the angles.

This tree is cultivated everywhere.
Alt. 1500 ft.
It attains the height of 15-25 ft. and a girth of 4-5 ft. Fl. in the cold season; Fr. in the hot season. Leaves are shed December-January; new leaves appear March-April.
Wood white, soft, spongy and useless. From incisions made in the trunk a yellow gum exudes, which is applied in rheumatism. Tender leaves, fruit and flowers are eaten as vegetable. Seeds yield a pure oil, which is said to be used as salad oil in the West Indies, and also employed by watchmakers. Twigs and leaves form a good fodder. The root bark has a strong flavour of horse-radish, and is used as counter-irritant in rheumatism.

M. Concanensis, Nimmo; Dalz. & Gibs. Bby. Fl. 311; Brand. For. Fl. 130. *Sainjna.*

A tree very similar to the last-named species, but distinguished from it by having very much larger leaves and rounded leaflets, which are often retuse and have much more powerful odour of horse-radish. Flowers yellowish, streaked with pink. Perfect anthers 5; abortive anthers 5, much smaller. Seeds ½ in. long, very broadly trigonous, with membranous wings.

This plant is found growing in Southern Konkan, Sind and Rájputána.
Fl. November-December.
Wood soft, light and useless. The unripe fruit is eaten.

LEGUMINOSÆ.

Mundulea suberosa, Benth.; Bedd. Fl. Sylv. An. Gen. 85.—*Tephrosia suberosa*, Dalz. & Gibs. Bby. Fl. 60. *Supti.*

Young parts, pedicels, and underside of leaves white tomentose. Leaves unequally pinnate, 6-9 in. Leaflets 13-21, 1½-2 by ¼ in., opposite, sub-opposite or alternate, elliptic-oblong or oblong-lanceolate, obtuse and sometimes mucronulate, coriaceous. Flowers large

Timber Trees.

rose-coloured, on short pedicels, arranged in terminal racemes. Calyx campanulate, 5-toothed Corolla ¾ 1 in Stamens monadelphous. Ovary sessile, many-ovuled; stigma capitate. Legume 3-4 in., densely silky, irregularly contracted between the seeds, 6-8-seeded.

Found growing on the ghâts of the Southern Konkan, Madras, Ceylon and in tropical Africa.

This small tree is very ornamental when in flower. Trunk erect, but very short

The leaves are used to intoxicate fish.

Sesbania Ægyptiaca, Pers ; Dalz. & Gibs Bby. Fl. Suppl. 21; Brand. For. Fl. 137. *Shewari, shevari, sewri, jait, janjan.*

Nearly glabrous. Leaves 3-6 in, abruptly pinnate. Leaflets 20-40, ¾-1 in. long, linear-oblong, obtuse, with or without a mucro-entire, membranous, pale-green. Flowers yellow, spotted with purple, 6-10, on spreading, slender pedicels ⅙-¼ in, forming lax, axillary drooping racemes Calyx ⅛ in. long, membranous. Corolla ½-⅝ in. Pod 6-9 in. by 2-2½ lin, torulose, pointed. Seeds 20-30, pale-brown.

Cultivated in many parts of India

Alt 4000 ft

A small tree with a height of about 15-20 ft and 1-3 ft in girth. Fl. at the end of rainy season and during the cold season. It is evergreen.

Wood white, soft, light, but close grained, said to make the best charcoal for gunpowder, and is used to boil *jaggri* The timber is cultivated to furnish poles in place of bambus, and also in some places to shade and support the betel plant. Rope is made of its bark. Leaves and young branches are a good fodder for cattle.

S. grandiflora, Pers.; Brand For. Fl. 137.—*Agati grandiflora,* Dalz. & Gibs. Bby. Fl. Suppl. 22. *Augusta, basna.*

Leaves ½-1 ft long, abruptly pinnate. Leaflets 40-60, 1-1½ in. long, opposite, linear-oblong, obtuse, and often mucronate, entire, membranous, glabrous, pale-green, on short petiolules. Flowers white or red, in short axillary racemes. Calyx 1 in. long, glabrous. Corolla 3-4 in. long. Pod 1 ft. or more, about 3 lin. broad, not torulose.

Cultivated all over India, on account of its tender leaves, pods and flowers It is said to be indigenous in the Indian Archipelago and North Australia.

This tree attains the height of 20-30 ft and a girth of 1-2 ft. It is in flower and fruit at all seasons of the year.

Wood white and soft; used only for fuel. The tree is cultivated in some parts as a support for the betel vine. Tender leaves, pods and flowers are eaten as vegetable.

Ougeinia Dalbergioides, Benth.; Brand. For. Fl. 146.—*Dalbergia oojeinensis,* Dalz. & Gibs. Bby. Fl. 78. *Tiwas, tunus, tunnia, telas, sandan, timsa.*

Branches terete, slender. Leaves about 12 in. long, ternate, alternate, stipulate, petioled. Leaflets coriaceous, glabrous or pubescent below, wavy; terminal leaflet, 3-6 by 2-5 in., roundish or obovate; lateral, 4 by 3 in., opposite, oblique-oval, obtuse, entire or crenate. Flowers numerous, white or pale-rose, fragrant, on slender

villous or glabrous, ½-¾ in. long pedicels forming short, fascicled racemes, from the nodes of old branches. Calyx ⅛-⅙ in. long, sub-bilabiate. Pod 2-3 in., linear-oblong, obtuse, contracted between the seeds. Seeds 2-5. **Timber Tree.**

Common in the forests of the Konkan and Northern India. Alt. 4-5000 ft.

A tree 20-40 ft. in height, with an erect short trunk 3-7 ft. in circumference. Fl. March-May; Fr. September-October. Sheds its leaves January-February; new leaves appear April-May.

Wood light-brown with yellow tinge, or dark reddish-brown, hard, strong, very tough, close-grained, and takes a beautiful polish. Used for building purposes, and for making agricultural implements, wheels, carriage poles, etc. The bark when incised affords a fine kino, which is used as an astringent in cases of diarrhœa and dysentery. The bark is used to intoxicate fish, and for this purpose many trees are found stripped of their bark.

Erythrina Indica, Lam.; Dalz. & Gibs. Bby. Fl. 70; Brand. For. Fl. 139. *Pangarah, Indian coral tree.*

A tree, armed with black prickles; petioles and leaves unarmed. Leaves pinnately-trifoliolate on petioles 4-6 in. long. Leaflets broad-ovate, entire, short-acuminate, somewhat cordate base, membranous, glabrous; terminal leaflet 4-6 in. long and broad, largest, round cuspidate, truncate, or broad rhomboidal at the base. Flowers bright scarlet, large, on pubescent pedicels ¼-⅓ in., arranged in axillary or terminal racemes, ½ ft. long. Calyx 1-1¼ in. long, spathaceous, with a very oblique mouth, 5-toothed at the top. Standard 2-2½ in. long; the blade 1 in. broad; wings and keel nearly equal and conform. Legume ½-1 ft., cuspidate, distinctly torulose, blackish, 1-8 oblong, red or purple seeds.

Wild and cultivated throughout India, Burma and Malacca; also in Java and Polynasia.

A tall tree 50-60 ft. high and 5-9 ft in girth; trunk straight, but rather short. Fl. February-March; Fr. May-July. Leaves shed in the cold season; new ones appear March-April.

Wood white, light, soft and open-grained, known as *mochi-wood* in Madras; employed in making light boxes, scabbards, trays, packing cases, toys, etc.; varnishes well, and the lacquered ware of different parts of India is made of it. The tree is generally planted as a prop for the vines of the betel and black-pepper plants, and also for hedges. The tender leaves are eaten in curries.

Butea frondosa, Roxb.; Dalz. & Gibs. Bby. Fl. 71; Brand. For. Fl. 142. *Palas, parás, pullus, kakria, dhak, chickra.*

Young parts covered with grey or brown silky pubescence. Leaves pinnately-trifoliolate, in petiole ¼-½ ft. long. Leaflets 4-6 in. by 3-4½ in., coriaceous, hard, glabrescent above, hoary beneath; two lateral ones oblique-ovate; the terminal one roundish, obtuse, often emarginate at the apex, rhomboid at the base, larger, as long as broad in the middle. Flowers large, bright orange-red, on thickly brown pubescent pedicels ½-1 in., arranged in tomentose, terminal and axillary racemes ½ ft. long. Calyx ½ in., silky inside. Petals equal, densely clothed on external side with silky pubescence; standard 1

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in. broad; keel acute, incurved. Legume pendulous, tomentose, 6-8 by 1½-2 in. Seed oval, flat, brown.

Common in the Konkan, Khándesh and Gujarát; also throughout India from the Himalayas to Ceylon and Burma.

Alt. 3-4000 ft.

An erect tree 40-50 ft. in height, with a trunk 6-10 ft. in girth. Fl. February-March; Fr. June-July. Leafless in the cold season, and is covered with new foliage April-May.

Wood coarse, open-grained, soft, light and spongy, not durable except under water; but it is used in making toys, trunks, packing cases, etc., which are afterwards varnished; otherwise the wood is readily attacked by insects. From fissures and incisions made in the bark there issues a red juice, which is soon converted into a ruby-coloured, astringent gum, similar to *kino*, and known in commerce as *Bengal kino*. In Central India lac is collected on the branches of this tree. Seeds are used as a vermifuge; leaves as plates by Hindus and as fodder for buffaloes. The flowers yield a yellow dye, and from the bark of the root is extracted a good fibre, which is made into coarse cordage for caulking boats and into slow matches.

Dalbergia latifolia, Roxb.; Dalz. & Gibs. Bby. Fl. 77; Brand. For. Fl. 148. *Shissam, sissu, kalaruk, blackwood* tree.

Glabrous. Leaves 4-7 in. on straight petiole. Leaflets usually 5 (3-7), 1½-2½ in. long and broad, often emarginate at the apex, cuneate at the base, entire, somewhat undulate, coriaceous, green or whitish beneath, on petiolules 3-4 lin. Flowers small, greenish or white, on short pedicels, forming lax, branched and divaricating panicles, shorter than the leaves. Calyx ⅛-⅙ in.; segments oblong, obtuse, shorter than the tube. Stamens 9, monadelphous; sheath open on the upper side. Legume oblong-linear or oblong-lanceolate, firm, brown, 1½-3 by ¼-¾ in.; 1-4 seeded.

Common in Southern Konkan, Southern Marátha Country, Madras, Central India, Sikkim, Burma, etc.

A tall tree 60-80 ft. in height with an erect trunk 3-6 ft. in girth, sometimes even 20 ft. Fl. in the hot season (a small variety—*D. sissoides*—in the rainy season); Fr. October-February. Leaves shed February-March; new ones appear April-May.

Wood varies from dark-brown to purple black, in white or purplish veins of lighter colour, close-grained, heavy, strong and durable, takes a fine polish. Extensively used for furniture, gun-carriage purposes, ploughs and other agricultural implements, and for house-building.

D. sissoo, Roxb.; Dalz. & Gibs. Bby. Fl. Suppl. 24; Brand. For. Fl. 149. *Sissu, shissam.*

Young parts and branches grey downy. Leaves alternate, imparipinnate, on a zig-zag petiole. Leaflets 3-5, 1-3 in. each way, orbicular, with a sudden long acumination, entire, firm, glabrescent. Flowers yellowish-white, nearly sessile, in densely pubescent, axillary panicles, much shorter than the leaves. Calyx ⅙ in. long, campanulate, pubescent; teeth very short; 2 upper ones obtuse, 3 lower acute; the central one the largest. Corolla twice the length of the calyx; standard with a long claw. Stamens 9, monadelphous; sheath open on the upper side. Legume thin, linear-lanceolate, pale-brown, glabrous, 1½-4 by ¼-1 in., with a stalk twice as long as the calyx, generally 2-3-seeded. Seeds compressed, reniform.

Cultivated and planted as an avenue tree everywhere. Indigenous in the Sub-Himalayan tract and in the plains of Central India, Afghanistan and Beluchistan. Said to be indigenous also in Gujarát. **Timber Trees.**

Alt. 3-5000 ft.

A handsome tree attaining the height of 60 ft., with an erect trunk 6-12 ft. in circumference. Fl. March-July; Fr. November-February. Sheds its leaves December-January; new leaves appear February-March; old trees do not generally shed its leaves.

Wood light greyish-brown, mottled with darker veins; in old trees sometimes nearly black, close-grained, remarkably strong; used extensively in boat-building, gun-carriages, carts, agricultural implements, door and window frames, furniture, and for various other purposes.

D. paniculata, Roxb.; Dalz. & Gibs. Bby. Fl. 78; Brand. For. Fl. 150. *Passi, padri, sondarra, dhobein, satpuria, topia, sheodar.*

Young branches, petioles and inflorescence clothed with short, grey, silky pubescence. Leaves 5-6 in., imparipinnate, turning black on drying. Leaflets 9-15, 1-2 by 1 in., oval or obovate-oblong, emarginate or retuse, entire, sub-coriaceous, green above, glaucous beneath, on a petiolule 1-1½ lin. Flowers white, tinged with blue, numerous, small, sub-sessile, crowded on short racemes forming terminal and axillary panicles. Calyx densely silky, ⅛ in. Corolla twice the length of the calyx. The limb of the standard broader than the base, without any callosity at the latter part; keel shorter than the petals. Stamens 10, diadelphous. Legume 1½-4 by ½-¾ in., brown, narrowed at both ends, 1-2-seeded.

Common on the Máwal districts above the ghâts in this Presidency, and all over the plains of Central and Southern India.

Alt. 2500 ft.

A tree which grows to the height of 30-60 ft. and more in favourable circumstances, with a trunk 8-9 ft. in circumference. Fl. March-May; Fr. May-July. Sheds its leaves February-March, and covered with new leaves April-May.

Wood greyish-white or yellowish, firm, often mixed with narrow, soft layers of a fibrous substance, liable to be attacked by insects. Not of much value, though used by the natives for building and many other purposes.

D. lanceolaria, Linn.; Dalz. & Gibs. Bby. Fl. 78; Brand. For. Fl. 151. *Dandous, kaurchi, takoli, harrani, gengri.*

Glabrous. Leaves 3-6 in., imparipinnate. Leaflets 11-15, 1-2 by 1 in., oval or broadly oblong, emarginate, obtuse or retuse, coriaceous, green above, and rather glaucous below. Flowers pale-blue, on short, slender pedicels, arranged in large, lax, terminal and axillary panicles; branches of panicles sub-glabrous, or clothed with rufous pubescence. Calyx ⅛ in. long, hoary; the teeth obtuse, the lowest rather longer and narrower. Corolla 2-3 times as long as the calyx; standard ¼ inch broad, obovate, with a large callosity at the base of the limb; keel much shorter than the wings. Stamens 10, diadelphous. Legume 1½-4 by ⅜-¾ in., brown, flexible, narrowed at both ends, with a long stalk. Seeds 1-4 (usually 2).

Common in the forests from the Western Himalayas to Ceylon. In this Presidency it is common in some parts of Khándesh, but rare in the Konkan.

Alt. 2500 ft.

A beautiful tree attaining the height of 30-40 ft. (in some places 60-80 ft.), with a straight trunk 4-5 ft. in girth. Fl in the hot season;

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Fr. in the rainy season. Sheds its leaves in the cold season, and covered with new ones in March.

Wood white, strong, without the peculiar concentric layer of the fibrous tissue of the last species. Said to be used for house-building and many other purposes. An oil is extracted from the seeds; this and the bark are employed medicinally by the natives.

Pterocarpus marsupium, Roxb.; Dalz. & Gibs. Bby. Fl. 76; Brand. For. Fl. 152. *Bibla, bija, piasal, dorbeula, asan, honay.*

A large deciduous tree, trunk cinereous. Leaflets alternate, coriaceous, 5-7, obtuse, acute or emarginate. Flowers numerous, yellowish-white, ½ in. in diam., arranged in paniculate racemes. Petals twice the length of the calyx, waved or curled. Sheath of monadelphous stamens is sometimes deeply divided into 2. Pod 1-2 in. broad, articular.

Common in the Konkan, Parnera Hill, Dang jungles and Central India, though now rare and nearly extinguished.

Alt. 3000 ft.

Attains 50-60 ft. height and 6-8 ft. girth. Fl. May-June; Fr. December-March.

Wood reddish-brown, close-grained, tough and strong. It takes a fine polish and is durable; valuable in house-building, and beautiful cabinet-work is made from it.

Pongamia glabra, Vent.; Dalz. & Gibs. Bby. Fl. 77; Brand. For. Fl. 153. *Karanj.*

A tall tree, with short, white or dark cinereous trunk. Leaflets 5-7, opposite, oblong or ovate, acute, 2-5 in. long. Flowers mixed white, blue or purple, in peduncled axillary racemes; pedicels with a pair of bracteoles in the middle. Calyx nearly truncate. Corolla much exserted, ½ in. in diam. Standard broad, keel obtuse, petals united. Legume thick, woody, 2 in. long, 1-2-seeded.

Planted and wild. Common in the Konkan. In the Deccan, along the banks of rivers. Attains 50-60 ft. height, and 5-8 ft. girth. Fl. May-June; Fr. April of the following year. It is almost evergreen, being bared of leaves only a short time in April.

Wood yellowish, hard and tough, and used for building and cart-wheels. From the seeds an oil is extracted, used for burning and in the cure of itch and various cutaneous eruptions. (*See* Pharm. Ind. 79.)

Poinciana elata, Linn.; Roxb. Fl. Ind. ii. 355; Bedd. Fl. Sylv. t. 178; Brand. For. Fl. 157.

An unarmed tree. Leaves ½ - ¾ ft. long; pinnæ 10-16; leaflets 30-40, caducous, sessile, obtuse. Flowers yellowish, in corymbs, terminal or from the upper axils. Calyx ¾-1 in. long. Petals 1 inch broad, shortly-clawed, curled on the margin. Filaments bright-red, much exceeding petals, 2-3 in. long, pubescent at the base. Legume flat, 6-8 in. by 1-2 in., 4-8-seeded.

Indigenous in forests of the western and eastern coasts of the Peninsula as far north as Gujarát. It is cultivated for the beauty of its numerous light-yellow flowers in Poona, Gujarát, Khándesh, near villages.

Wood yellow, close-grained, and polishes well; useful for furniture.

Poinciana regia, Dalz. & Gibs. Bby. Fl. Suppl. 27; Bedd. Fl. Sylv. 91. *Gulmohr.*

Leaves bipinnate ½-2 ft. long; pinnæ 8-20 pair, leaflets in 15-20 pairs, nearly sessile, oblique base, ⅓-½ in. long. Flowers large, bright scarlet or crimson in axillary or terminal racemes. Petals waved, 2 or 3 times larger than the calyx, tapering into claws, 1 in. long, the upper petal more cuneate, variegated red and yellow. Stamens nearly as long as the petals, pubescent at the base. Pod 1-2½ ft. by 2 in., flat, sessile, glabrous, many-seeded. Seeds ⅜ in., oblong, variegated brown and white. Timber Trees.

This splendid ornamental tree introduced from Mauritius and Madagascar some sixty years ago, is now naturalized all over India.

Attains 30-40 ft. height and 3-4 ft. girth. Fl. April-June; Fr. in the cold season. Is leafless for a short period in the hot season.

Wood white, soft, and loose-grained. Takes fine polish, but no use is made of it in this Presidency.

Cassia Siamea, Lam.; D. C. Prod, ii. 499.—*C. Sumatrana,* Dalz. & Gibs. Bby. Fl. Suppl. 29.—*C. florida,* Bedd. For. Sylv. t. 179. *Kassod.*

A robust tree, with virgate grey-downy branchlets. Stipules small, caducous. Leaves abruptly pinnate, 6-12 in.; leaflets 12-28, 1-3 in., oblong, more or less emarginate with a mucro, sub-coriaceous, glabrous or finely downy, on a small petiolule. Flowers yellow, ¼-1 in. on puberulous pedicels, disposed in corymbose racemes, forming both axillary and terminal panicle ½-1 ft. long. Pod 3-7 in., nearly straight, flat, stalked, brown, many-seeded. Seeds dark-brown, glossy.

Cultivated in various parts of this Presidency, and is said to grow wild in the forests of the Peninsula, Ceylon, Tenasserim, Ava and the Malay Isles.

Attains 30-60 ft. height and 3-6 ft. girth. Is an almost evergreen tree. Fl. nearly all the year round, chiefly in the cold season; Fr. March-April.

Wood dark-brown, often streaked, close-grained, strong and durable. Takes fine polish, and is well adapted for furniture and cabinet-work.

Cassia glauca, Lam.; D. C. Prod, ii. 495; Dalz. & Gibs. Bby. Fl. Suppl. 30.

A tree with glabrous branchlets. Leaves distinctly petioled, abruptly pinnate, 6-12 in., leaflets 8-20, 2-4 in., ovate acute or blunt, sub-coriaceous, very glaucous; common petiole more or less silky-downy, with glands between the lower only, or between all the leaflets. Stipules small, caducous. Flowers rather large, yellow, on filiform about 1 in. long pedicels, arranged in axillary or terminal corymbose racemes. Pod 6-8 in. by ½-¾ in., flat, strap-shaped, 20-30-seeded. Seeds brown, compressed.

Common in gardens in Bombay, Poona and other parts of this Presidency. Said to grow wild from the Himalayas to Ceylon and Malacca. Fourteen to sixteen feet high. Fl. and Fr. all the year round, chiefly in the rainy season.

Cassia fistula, Linn.; Dalz. & Gibs. Bby. Fl. 80; Brand. For. Fl. 164. *Bawa, garmala, amaltas.*

A moderate-sized tree with grey trunk. Leaves pinnate, 12-18 in. long; leaflets 4-8 pairs, ovate or ovate-oblong, 2-5 in. long, on

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petioles 2-3 lin. long, acuminate, thin. Stipules minute. Flowers large, showy, yellow, on slender pedicels, 1½-2 in. long, arranged in drooping racemes, 1-2 ft. long, from the axils of the new leaves or from above the scars of fallen ones. Calyx of 5, nearly equal, velvety, deciduous lobes. Petals obovate-oblong, nearly equal, about 1 in. long. Stamens unequal, the 3 lowest longest, incurved, 1-3 very short. Pod cylindrical, pendulous, 2-3 ft. long, dark-brown, smooth, indehiscent, divided into numerous one-seeded chambers by thin transverse partitions. Seeds ovoid, somewhat compressed, brownish, enveloped in a soft black pulp.

Very common in the Konkan and throughout the ghâts and hilly parts of India.

Alt. about 4000 ft. at Mahábaleshvar and in the outer Himalayas.

Attains 30-50 ft. height, and 3-6 ft. girth. Fl. April-June; Fr. next cold season.

Wood red or reddish-brown, often beautifully mottled; very durable; makes good posts, ploughs, and spars of boats.

Hardwickia binata, Roxb.; Dalz. & Gibs. Bby. Fl. 82; Brand. For. Fl. 162. *Anjan* (by which name *Memecylon edule* is also known), *tam*, *parsed*.

Trunk straight, black and rough. Leaflets 2, like those of the *Aptá* tree, sessile, oblique, ovate-trapezoid, entire, obtuse, 1-3 in. long with 4-5 veins radiating from the base. Stipules small, caducous. Flowers greenish-yellow, on long terminal and axillary panicled racemes. Pedicels as long as the calyx. Sepals oblong, obtuse, about ⅛ in. long. Ovary oblong, sessile, stigma capitate. Pod thin, lanceolate, 2-3 in. long, dry, with 1 seed at the top.

In Khándesh, Nimár and also in the Lulling Pass between Málegaon and Dhulia. The tree grows also in the Madras Presidency, in Berár, Chanda, etc.

Attains 50-60 ft. height, occasionally 120 ft. Fl. in the cold season; Fr. April-May.

Wood dark, reddish-brown, hard and durable; takes fine polish, and is used for ornamental works and house posts. From the inner part of the bark, strong fibres are extracted, and used for cordage. The leaves afford good fodder for cattle.

Saraca Indica, Linn.; Brand. For. Fl. 166; Bedd. Fl. Sylv. t. 57.—*Jonesia asoca*, Dalz. & Gibs. Bby. Fl. 82. *Asok, jassundi.*

Leaves abruptly pinnate, sessile or nearly so, 12 in. long, drooping, reddish when young; leaflets opposite, 4-6 pairs, oblong-lanceolate, acute or obtuse, rigidly sub-coriaceous, shining, 2-9 in. long. Corymbs terminal and axillary, large, 3-4 in. broad, crowded with flowers of beautiful orange colour; pedicels coloured ¼-½ long, with coloured ovate bracts. Filaments 3 times as long as the sepals. Pods 6-10 in. by 2; hard, woody, dehiscent. Seeds 4-8, smooth, compressed, 1½ in. long.

Common about the ghâts of Southern India and Eastern Bengal; cultivated in Hindu temples and in gardens. (*See* Religious Plants.)

Handsome evergreen tree, attains 12-25 ft. height or more, and 2-3 ft. girth. Fl. March-April; Fr. August-September.

Wood hard, tough, and dark-brown.

Tamarindus Indica, Linn.; Dalz. & Gibs. Bby. Fl. 82; Brand. For. Fl. 163. *Ambli, chintz.* Timber Trees.

This is the well-known tamarind tree, common in this and the other Presidencies and in Burma.

Attains 50-80 ft. in height and 6-12 ft. girth, often 25 ft. Evergreen, but changes leaves in April. Fl. May-June; Fr. next cold season.

Wood hard, durable, but difficult to work upon.

Bauhinia racemosa, Lam.; Dalz. & Gibs. Bby. Fl. 82; Brand. For. Fl. 159. *Seyara, aptá, kachnal, ashta, maula, dorara.*

A tree having a dark-grey or brown trunk with exfoliating scales and drooping branches. Leaves cordate at the base, deeply cleft, broader than long, with rusty or grey tomentum on the under surface. Flowers whitish-yellow, in short-peduncled lax racemes, terminal or leaf-opposed, ¼-½ ft. long; pedicels shorter than calyx. Bracts deciduous. Calyx tube turbinate. Petals oblanceolate. Stamens 10, all fertile. Pod 5-12 in. by 1 in., thick, falcate, 12-20-seeded.

Very common in this Presidency and all over India, ascending to 5000 ft.

Attains 20-30 ft. height and 3-4 ft. girth. Fl. March-June; Fr. November-March of the following year. Sheds leaves December-January, and renews them March-June.

Wood reddish-brown, hard, used for agricultural implements. The bark furnishes a fibre of which strong durable ropes and slow matches for match-lock men are made.

Xylia dolabriformis, Benth.; Dalz. & Gibs. Bby. Fl. 85; Brand. For. Fl. 171. *Jamba, yerrul, suria.*

Leaves bipinnate; pinnæ 2; leaflets 4-10, opposite, oblong, acute, sub-coriaceous, 3-6 in. long, the terminal leaflets much larger. Flowers yellowish, sessile, in dense peduncled heads, crowded on 1-2 in. long peduncles arising from above the scars of the fallen leaves. Corolla ¼ in. Stamens 10. Pod woody, falcate, flat, greyish-brown, 4-6 in. by 1-2½ in., 6-10-seeded.

From Kolába Collectorate to Sávantvádi and Eastern and Western Godávari forests and in Burma, Singapore and the Philippines.

Alt. 3000 ft.

Attains 50-60, sometimes 100 ft. height, and 9-12 ft. girth. Fl. March-April; Fr. October-November. Sheds leaves during hot season.

Wood, called the iron-wood of Burma, is dark-red, hard, strong and durable, not attacked by white ants, and difficult to be worked upon. Used for ploughs, building posts and for other purposes.

Adenanthera pavonina, Linn.; Dalz. & Gibs. Bby. Fl. Suppl. 26; Brand. For. Fl. 168. *Thorlá-gunj* or *mottá-gunj.*

An unarmed tree; leaves abruptly bipinnate, 1-2 ft. long; pinnæ 4-6 pair, opposite, short-peduncled, 4-8 in. long; leaflets 8-12 pair, oblong, alternate, ¾-1½ in. long, on very short petiolules. Flowers small, yellow, faintly fragrant, in short-peduncled racemes, 2-6 in. long, simple from the axils of the leaves and panicled at the end of the branches. Pod 6-9 in. by ½ in., twisted, 10-12-seeded. Seeds scarlet red, shining, convex on both sides.

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Wild and planted in Southern India, Bombay, Gujarát, Khándesh, Bengal, Burma, Sikkim, ascends to 2500 ft. Height 50-70 ft. and girth 4-6 ft. Fl. March-May; Fr. August-October.

Wood heavy, fibrous, hard and durable. When fresh cut, of yellowish-red colour, turning brown or purplish on exposure. Useful for cabinet-work. Seeds used as weight (each about 4 grains) by jewellers, and worn as ornament. Oil is said to be extracted from them, and from the wood a red dye is prepared.

Prosopis spicigera, Linn.; Dalz. & Gibs. Bby. Fl. 84; Brand. For. Fl. 169. *Shemi, shemri.*

Branches unarmed or covered with scattered, nearly straight prickles. Pinnæ mostly 4, 1-2 in. long; leaflets 16-24, sessile, obliquely oblong, cuspidate, $\frac{1}{4}$-$\frac{1}{2}$ in. grey, coriaceous. Flowers small, yellow, in short-peduncled axillary spikes, 2-3 in. long, and terminal panicles. Calyx minute, cup-shaped; corolla $\frac{1}{12}$ in. long; pod straight, pendulous, glabrous, contracted between seeds, 4-8 in. by $\frac{1}{4}$ in., filled with farinaceous edible substance. Seeds 5-15, brownish, oblong.

In Gujarát, Deccan, Bundelkund, Sind, Punjáb, Rájputána, etc. Fl. February-May; Fr. May-August. Sheds leaves in March, and renews them soon after.

Wood light yellowish-brown, coarse-grained, tough but readily attacked by insects. Used for carts and agricultural implements. Its heating power is equal to that of *babul;* hence it is used as fuel for steamers and locomotives. The pod is useful as fodder for camels, goats, etc. The mealy substance (pulp) in which the seeds are imbedded is eaten in Gujarát and in the Deccan; for this purpose the pods are collected before they are quite ripe; the sweetish pulp is eaten raw or boiled with vegetables, butter and salt. This tree is worshipped in the Deccan at the Dusserá festival.

Acacia Farnesiana, Willd.; Brand. For. Fl. 180; Bedd. Fl. Sylv. t. 52. *Gu-kikar, vilayti-babul.*

This small evergreen tree is armed with straight sharp spines and cultivated all over India on account of its yellow sweet-scented flowers arranged in globose heads. Fl. January-March, sometimes in the rainy season. Attains 20-25 ft. height, and 1-2 ft. girth.

Wood very hard and tough, much used in some parts for ship keels, tent-pegs, etc. Exudes considerable quantity of a white gum, which is collected in Sind.

Acacia Arabica, Willd.; Dalz. & Gibs. Bby. Fl. 86; Brand. For. Fl. 180. *Babul, babur.*

A tree with grey-downy, thorny branches. Spines $\frac{1}{4}$-2 in. long, large, white, often with brown points, straight, somewhat ascending. Leaf-rachis downy with several cup-shaped glands; pinnæ generally 6-12, $\frac{1}{2}$-$1\frac{1}{2}$ in. long; leaflets 20-40, linear, membranous, $\frac{1}{4}$ in. glabrous or downy. Flowers yellow, in globose heads. Peduncles slender, grey-downy, with bracts in the middle, 3-6 fasciculate. Corolla campanulate, twice the length of the calyx. Pod coriaceous, densely grey-downy, stalked, $\frac{1}{4}$-$\frac{1}{2}$ ft. by $\frac{1}{2}$ in.; moniliform, 8-12-seeded.

Common in the Deccan, Gujarát, Sind, and many parts of India; and is cultivated.

Attains 50-60 ft. height and 5-12 ft. girth. Ascends 4000 ft. Fl. in the rainy season. Timber Trees.

It is stated in the Bombay Flora that "there is a singular variety with erect branches, like a cypress in growth and very handsome, called *ram-kanta*. This is *A. cupressiformis* variety known also as *ran-babul kabuli-kikar*, common in some parts of the Deccan, Sind, and Rájputána, &c. The other variety, *eri-babul*, is what is called *Spina albida*, a young luxuriant plant with long, strong, white spines."

Wood pale-red or dark reddish-brown, strong, close-grained, and durable; employed for agricultural implements, tent-pegs, sugar-rollers, oil-presses, etc.; it is excellent for carts and gun-wheels. It is also a good fuel, as it has great heating powers. Indian gum-arabic is the concreted exudation from wounds made in the bark. It is used in native medicine and also by dyers and cloth-printers. The bark of the trunk is used for tanning and dyeing, and that of the root is said to be employed in the preparation of some sort of native spirit. The shoots, leaves and green pods are greedily eaten by cattle. In times of famine the bark is ground and mixed with bájri flour and eaten. The tender pods are used at all times as vegetable.

Acacia eburnea, Willd.; Dalz. & Gibs Bby. Fl. 85; Bedd. Fl. Sylv. 95. *Marmat.*

A small tree with slender downy or glabrous branchlets. Spines ¼-2 in.; the long ones ivory-white. Pinnæ 4-10, ¼-½ in. long, with a gland between the lowest pair, and occasionally one between the uppermost; leaflets 12-16 very small, linear, obtuse, coriaceous, grey-green, downy. Heads of flowers yellow, about ½ in. diam.; peduncles axillary, solitary or several, densely grey-downy with bracts about the middle. Corolla about twice the length of the calyx, tubulose. Legume stalked, 2-6 in. by ¼ in., thin, flat, glossy, 6-12-seeded.

Common in Southern India, Deccan and Sind in dry barren places; also in some parts of the Himalayas, Afghanistan and Aden.

Alt. 3-5000 ft.

Attains generally 14-20 ft. height. Fl. November-January; Fr. May-June.

This is used for fuel.

Acacia tomenotsa, Willd.; Dalz. & Gibs. Bby. Fl. 86; Bedd. Fl. Sylv., 95. *Hewar.*

A small armed tree or shrub with branchlets and petioles velvety with dense grey tomentum, the latter with several glands. Spines 1-2 in. long, dark-coloured. Pinnæ 12-24, 1-2 in. long; leaflets 40-60, very small, linear, obtuse, grey, more or less pubescent, membranous. Flowers white, purplish, ½ in. diam.; peduncles axillary, densely pubescent, with a bract about the middle. Pod thin, flat, dry, dehiscent, falcately contorted, 4-6 in. by ½ in., 6-10-seeded.

In the Deccan and Khándesh jungles; also in Sholápur and Ceylon.

Used for fuel and fences.

Acacia leucophlea, Willd.; Dalz. & Gibs. Bby. Fl. 86; Brand. For. Fl. 184. *Hewar*, name also given to the preceding species; *nimbar, rohani, safed kikar.*

Branchlets, leaves, petioles and branches of inflorescence grey-downy. Spines ¼-1 in., stipulary, straight. Petiole with several

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cup-shaped glands. Pinnæ 12-24, 1-1½ in. long; leaflets 30-60, rigid, coriaceous, ⅛-⅙ in., obliquely oblong obtuse. Flowers small, pale-yellow, nearly white, in globose heads, not more than ¼ in. diam., disposed in terminal leaflets about 1 ft. long panicles; peduncles short with 2 bracts. Pod 4-8 by ¼-⅓ in., sessile, slightly twisted, clothed with pale-brown or grey tomentum. Seeds 8-12.

Common in Southern Marátha Country and in Sholápur, North-West Provinces to Ceylon, Burma, Malay Isles and Timor.

Attains 25-50 ft. height and 4-6 ft. girth. In dry places is reduced to a small bushy tree. Fl. August-November, sometimes as early as May; Fr. November-April.

Wood hard and strong, of a brownish-red colour, loose-grained; seasons well and takes a fine polish, but is somewhat brittle; it is also used for fuel and other various purposes. From the tough and strong fibre of the bark, fishing-nets and cordage are made. The bark being ground and mixed with bájri flour is eaten in times of scarcity. It is added to sugar and palm juice in the distillation of spirits on account of the tannin it contains, which serves to precipitate the albuminous substances of the juice. Tender pods are eaten as vegetable, and the seeds boiled or ground and mixed with bájri flour. Large excrescences, like those found on *Prosopis spicigera*, but more spongy, are often seen on the branches.

Acacia suma, Kurz.; Brand. For. Fl. 187.—*A. catechu,* Dalz. & Gibs. Bby. Fl. 86. *Daula* (white), *kair, ker.*

A tree with white bark and downy branchlets. Spines twin, short-hooked, infra-petiolary. Leaf rachis ¼ ft. long, with a large cup-shaped, oval gland at the base, and several smaller ones between several of the upper pinnæ; pinnæ 20-40, 1½-2 in. long; leaflets 60-100, approximate, rigid, pale-green, ¼ in., pubescent. Flowers pale-yellow, almost white in axillary, 1-4-nate, 3-4 in. long, spikes. Legume 3-4 in. by ½-⅔ in., stipitate, and beaked, 6-8-seeded.

Common in the Konkan and also in Gujarát and Deccan, but stunted. In Madras, Bengal and Ceylon.

Attains 15-30 ft. in height and the trunk 3-4 in. girth. Fl. May-August.

Wood dark-coloured, extremely hard, durable, and stands a good polish. It is used for ploughs, cotton-rollers, and rice pestles. But the most valuable product of this and the allied species, *A. sundra,* is *catechu, cutcu* or *katha.* In Goa and Malabár it is made by men called *kathacadis* from the heart-wood, and is extensively used with betel leaves and largely exported to Europe for dyeing and tanning. In medicine it is used in the same complaints as kino. The bark is also used for tanning.

Acacia sundra, D. C.; Dalz. & Gibs. Bby. Fl. 86.—*A. catechu,* Brand. For. Fl. 186. *Lal-keir.*

Resembles closely *A. suma,* from which it chiefly differs by its dark-brown or purplish bark. Spines short, hooked, twin, brown, infra-petiolary. Leaf rachis glabrous or pubescent, about ½ ft. long, often with scattered prickles, and a gland below the insertion of the pinnæ, and smaller ones between several of the upper pinnæ. Pinnæ 30-40; leaflets 40-80, ¼ in. long, very close, ligulate. Flowers pale-yellow, in solitary, or fascicled, axillary, 3-4 in. long spikes. Petals linear, three times longer than the glabrous calyx. Legume stipitate, strap-shaped, brown, 2-3 in. by ½-⅔ in., 3-10-seeded.

Common in the Deccan, most parts of India, Burma, Ceylon. Alt. 3000 ft.

Attains 30-40 ft. in height, and the short trunk 4-10 in girth. Fl. May-July; Fr. September-November. Old leaves shed in February-March; the new foliage March-April. Timber Trees.

The wood is of a dark-red colour, heavy and durable, and used for building purposes, ploughs, etc. This species (like the above) yields *katha*.

Acacia ferruginea, D. C.; Brand. For. Fl. 185; Bed. Resembles *A. suma*, from which it differs by its dark-brown bark.

Spines short, hooked, twin, infra-petiolary; sometimes absent. Leaf rachis with one small circular or linear gland on the common petiole, and one between the uppermost pinnæ. Pinnæ 6-12, 2-3 in. long; leaflets 20-60, ¼-½ in., glaucous, rigid-subcoriaceous. Flowers yellowish, in dense axillary spikes, 4-5 in. long. Corolla very small. Pod 3-4 by ¾ in., dark-brown, glabrous, veined, 4-6-seeded, the upper suture narrowly winged.

It is a large tree found in the forests of Panch Mahâls and the Konkan. Attains 25-40 ft. height, and Fl. October-November; Fr. January-February.

The wood is of a reddish-brown colour, heavy and durable, used in building and in the construction of agricultural implements. The bark is strongly astringent, and said to be employed in the distillation of arrack.

Acacia latronum, Willd.; Dalz. & Gibs. Bby. Fl. 87; Brand. For. Fl. 180. *Bhes*.

A glabrous shrub or small tree, forming an umbrella-like crown when old, armed with twin, straight, white, stipulary spines, connate at the base, ¼-2½ in. long. Leaves often very close with a gland on the glabrous or (sometimes) pubescent petiole. Pinnæ 6-10, 1 in.; leaflets 20-30, ⅛-¼ in., ligulate, glabrous or pubescent, rigid. Flowers fragrant, white, becoming yellow in time, in spikes 1-1½ in., arising from the leafless branchlets. Corolla very small. Pod ½-2 by ½-¾ in., dehiscent, falcate, dark-brown, 2-4 seeded.

Common in the Eastern Deccan and in the Madras Presidency. Fl. January-March.

There are four more species of the genus growing in the Bombay Presidency, but they are climbers.

Albizzia odoratissima, Benth.; Dalz. & Gibs. Bby. Fl. 88; Brand. For. Fl. 175. *Borhi chichanda, bhandir, bansa, bas, ransiris, sirsa* or *kala sirsa* (black), *harreri*.

An unarmed tall tree. Branchlets, petioles, inflorescence and under side of the leaves finely downy. Common petiole 6-12 in. long, with a gland at the base, and of the 1-2 upper pinnæ. Pinnæ 6-16, 4-6 in.; leaflets 16-50, ¾ in., oblong, unequal-sided, rigid, glaucous beneath, with the midrib parallel with the upper edge at a short distance from it. Flowers pale-yellow, fragrant. Heads few-flowered, very numerous, on peduncles ½-¾ in.; peduncles disposed in corymbose panicles, terminal or from the upper leaf-axils. Calyx very small, about five times shorter than grey-silky corolla. Legume 6-8 by 1-1½ in., firm, opaque or glossy, 8-12-seeded.

Konkan, Southern India, Panch Mahâls in Gujarât, Madras, Bengal and Burma. It is also planted in many places.

Timber Trees.

Alt. 5000 ft., 30-40 ft. high, in favourable situations higher, girth of the trunk 5-6 ft. Fl. April-June; Fr. in the rainy season. It is an almost evergreen tree.

This large tree yields wood of a rich dark-brown colour, hard and strong. It takes a fine polish, and is used for naves, oil-mills and furniture.

A. Lebbek, Benth.; Dalz. & Gibs. Bby. Fl. 88; Brand. For. Fl. 176. *Siris, harreri, kalsis, garso.*

A tall unarmed tree. Common petiole 3-12 in., glabrous or downy, with a large gland near the base. Pinnæ 4-8 with or without one or more glands between the lowest; leaflets 8-18, unequal-sided, rigid, glabrous or pubescent, obtuse, 1-1½ in. Flowers white, fragrant, glabrous or downy, larger than in the last species, on pedicels ⅙ in. long. Heads many-flowered, on peduncles 3-4 in., 3-4 together, arising from the uppermost axils. Legume 8-12 by ¾-1½ in., firm, yellow-brown, thin, 6-12-seeded.

Common in the Konkan, Madras and Bengal, extending to the sub-Himalayan tract. It is planted in Bombay and elsewhere.

Alt. 5000 ft., 30-60 ft. high, with a girth of 6-10 ft. Fl. April-June; Fr. August-September. Like the last it is nearly evergreen, new leaves appearing March-April. The wood is similar to that of the last species.

A. procera, Benth.; Brand. For. Fl. 175.—*Acacia procera,* Dalz. & Gibs. Bby. Fl. 87. *Kinye, kilai, kili, karallu, tihiri, gurar, karo, gurkur.*

A large unarmed tree with white bark. Tender leaves downy. Common petiole 6-12 in., with a large, brown, oblong gland near the base. Pinnæ 4-12; leaflets 12-24, short-petioled, sub-coriaceous, rigid, obtuse, 1-1½ in., obliquely truncate at the base. Flowers yellowish-white, borne on peduncles 1 in., in fascicles of 2-5, arranged into more or less ample terminal panicles. Legume 6-9 by ¾-1 in., thin, reddish-brown, dehiscent, 8-12-seeded.

Common near the ghâts in the Deccan and still more so in the Konkan, Madras, along the Western forests, Himalayas, Burma, Malay and Philippines. Attains 60-80, and in favourable places 100 feet in height and the trunk 6-9 ft. in girth, or more. Fl. May-June; Fr. January-February. Almost an evergreen; the foliage is renewed in April-May.

The wood is dark-brown with patches of a darker colour; largely used for rice-pounders or pestles, wheels, etc.; it takes fine polish, and is recommended for furniture. The bark is used for tanning, and mixed with flour has been consumed as food in times of famine.

A. stipulata, Boiv.; Dalz. & Gibs. Bby. Fl. 88; Brand. Fr. Fl. 178. *Kasir, shembar, udul, oi, sumsundra, siran.*

A large unarmed tree. Branchlets, petioles and inflorescence tomentose or downy. Common petiole 6-12 in., with a large gland near the base, and several smaller ones between the pinnæ. Pinnæ 12-40, 4-5 in.; leaflets 40-80, ½ in., membranous, sensitive, sessile, glaucous beneath, broader at the base, acute at the apex. Stipules large, cordate, acute, membranous, velvety, pubescent. Flowers yellowish, inodorous, almost sessile; stamens pink. Heads on ½-1 in. downy peduncles clustered, or racemose disposed in terminal panicles. Calyx very small, funnel-shaped. Corolla three times longer. Legume 5-6 by ¾-1 in., flat, indehiscent, pale-brown, 8-10-seeded.

Common on the gháts, Mátherán, Mahábaleshvar in ravines, Mádras, Kumaon, Sikkim to Ceylon and Burma. Timber Trees

Alt. 4000 ft.

Attains 60-80 ft. height, and 8-12 girth. Fl. April-June; Fr. September-October. An evergreen tree, never altogether leafless, renews leaves February-March.

The wood is strong, coarse-grained, of a reddish-brown colour, and used for building purposes. It takes fine polish, and is good for cabinet-work and furniture. The leaves serve as cattle fodder.

A. amara, Boiv.; Dalz. & Gibs. Bby. Fl. 88; Brand. For. Fl. 178. *Lalai.*

A middling-sized, unarmed tree; branchlets, petioles and inflorescence densely pubescent. Common rachis 2-4 in. with one small circular gland below the pinnæ, and one above, at the insertion of one pair of the pinnæ. Pinnæ 8-20, 1-3 in.; leaflets 30-60, $\frac{1}{4}$-$\frac{1}{3}$ in., membranous, sessile, caducous, glaucous beneath, the midrib nearly in the middle. Flowers yellow, fragrant in heads, on numerous peduncles, crowded in the axils of the uppermost much reduced leaves. Calyx minute. Corolla three times the length of the calyx. Legume 4-6 by 1 in., pale-brown, 6-10-seeded.

Common at Mahábaleshvar in ravines, on the banks of the Krishna, about Nalativad, at Mátherán, and in the Deccan; in the dry forests of Madras and Ceylon. Fl. April-June; Fr. September-October.

The wood is like that of the other species, and used for ploughs, carts and building purposes.

Pithecolobium dulce, Benth.; Brand. For. Fl. 173.—*Inga dulcis*, Dalz. & Gibs. Bby. Fl. Suppl. 25. *Vilayti ambi, chinch, Deccani babul.*

A middle-sized, glabrous tree, armed with short stipulary spines, pointing upwards. Pinnæ and leaflets 2. Leaflets unequal-sided, 1-2 in., oblique, obovate-oblong, rigidly sub-coriaceous, obtuse, glaucescent. Flowers white, sessile, in small heads, $\frac{1}{2}$ in. broad, on long terminal, racemose panicles. Calyx a line long. Pod 4-5 by $\frac{1}{2}$ in., fleshy coriaceous, twisted. Seeds 6-8, dark-brown, imbedded in a pulpy, white, firm, sweet, edible pulp.

A large tree of Mexico, naturalized in Southern India, and common about Bombay in hedges. Attains 20-30 ft. height and 4-5 ft. girth. Is evergreen. Fl. January-March; Fr. ripens April-June.

The wood is of a reddish-brown colour used for various purposes and for fuel. Smells unpleasantly when fresh sawn. The fruit is eaten at Manilla, and an oil is extracted from the seeds in Madura and Tinnevelly.

Pithecolobium bigeminum, Benth.; Dalz. & Gibs. Bby. Fl. 89; Brand. For. Fl. 173. *Kachlora.*

A large, unarmed tree; branchlets, inflorescence, and legume with thin, brown, ferruginous pubescence. Common petiole 1-3 in., with an oval gland on it, and at the base of each pinna and leaflet. Pinnæ 2-4; leaflets 4-6, sub-coriaceous, elliptic-oblong, or obovate-oblong, acute, the upper 4-6 in., the lower shorter, all like the pinnæ distinctly petioled. Flowers white, silky. Heads with 6-12 sub-sessile flowers in copious, large, axillary and terminal panicles. Pod 3-6 by $\frac{1}{2}$-$\frac{3}{4}$ in., generally spirally twisted, slightly pubescent, valves coriaceous.

Timber Trees.

Southern Konkan and Western forests of Madras, Eastern Himalaya, Nepaul, Ceylon and Indian Archipelago.

Alt. 3000 ft.

Fl. March-May; Fr. August-October. Is an evergreen tree.

Wood dark-coloured, called by some *iron-wood.*

ROSACEÆ.

Pygeum Gardneri, Hook.; Hook. Fl. Ind. ii. 321; *P. Zeylanicum,* Dalz. & Gibs. Bby. Fl. 82. *Dacca, kaula (?)*

A large, glabrous tree; inflorescence with tomentose pubescence. Leaves 4-6 in., alternate, coriaceous, entire, glabrous, ovate-oblong or ovate-lanceolate, acuminate, base acute, or rounded, equal or unequal; basal glands none; petioles glabrous; of young leaves silky. Flowers ¼ in. diam., yellowish-white, on ¼-½ in. stout pedicels disposed in racemes 3-4 in. long. Calyx tube urceolate; limb 10-12 obtuse lobes. Petals none. Stamens 12. Ovary hirsute; style exserted, 1-1½, smooth, obtusely and transversely 2-lobed.

Mahábaleshvar and other ghâts of Bombay, rare; and on Nilghiri Hills. Attains 25-40 ft. in height and 4-8 girth. Ascending 4500 ft. at Mahábaleshvar. Fl. in the rainy and cold season; Fr. March-May.

Sapwood dark-red. Heartwood whitish, coarse-grained—used, I am informed, for making boxes, planks, rafters and beams.

RHIZOPHOREÆ.

Rhizophora mucronata, Lam.; Dalz. & Gibs. Bby. Fl. 95; Brand. For. Fl. 217. *Kamo, bhora*—Sind and Bengal names.

A small glabrous tree. Leaves 3-7 by 1½-4 in., oval, or elliptic-oblong, mucronate, narrowed at the base, rather long-petioled, coriaceous. Flowers pedicellate, greenish-white, rather large, sweet-scented, on peduncles arising from the axils of leaves, longer than the petioles, about 3-6-flowered. Calyx segments triangular. Petals villous at their involute margins. Stamens 8. Fruit about 1 in. diam., ovoid or obconic, furrowed, supported at the base by the reflexed limb of the calyx. Radicle of the fruit germinating on the tree about 2½ ft. long.

Common in the salt marshes along the coast of this Presidency, of Madras, Bengal and Burma. Is also found in Africa and Australia. An evergreen tree, attaining 15-25 ft. in height and 1-2 ft. in girth. Wood greyish, or pale-red, hard, rather heavy, close-grained and durable. Bark employed in tanning, and the fruit said to be edible.

Bruguiera gymnorhiza, Lamk.; Brand. For. Fl. 219.—*B. Rheedii,* Dalz. & Gibs. Bby. Fl. 95. *Kakra, kamkra*—Bengal names.

Glabrous tree. Leaves shortly, oblong-elliptic, or oblong-lanceolate, 3-6 by 1½-2½, coriaceous, on a thick petiole, 1 in. long. Stipules oblong, very deciduous. Flowers red, about 1 in. diam., on short, thick drooping peduncles, shorter than the petioles, solitary in the axils of the leaves. Calyx tube almost campanulate; limb 10-14-cleft; the segments 6-8 lin., stiff. Petals 10-14, densely hairy at the base, 2-lobed, with 2-4 bristles on each lobe and one in the sinus between the lobes. Fruit oblong, drooping, crowned at first with the stiff calyx lobes; germinating radicle cylindric, smoothish.

Common along the coast, estuary of the Indus, Sunderband, and Indian Archipelago. An evergreen tree, 30-40 ft. high, with a girth of 5-8 ft. Fl. January-May. Timber Trees.

Wood yellowish or reddish-brown, close-grained, coarse-fibrous, hard, heavy, strong and durable. Bark contains large quantity of tannin, and constitutes an article of commerce.

Bruguiera parviflora, described in the Bombay Flora under the name *Kanilia parviflora,* is a small shrub also found on salt marshes along the coast.

Carallia integerrima, D. C.; Dalz. & Gibs. Bby. Fl. 95; Brand. For. Fl. 219. *Panschi.*

Leaves dark-green, lucid, quite entire, or rarely serrulate towards the apex, elliptic-ovate, obovate, narrow, oblong, obtuse, acute or short acuminate, narrow or acute at the base, glabrous, coriaceous. Flowers white, very small, usually 8-merous, in dense, almost capitate, short-peduncled, axillary cymes. Calyx broad-campanulate. Petals deeply laciniate, obovate, concave, not embracing the stamens. Berry size of a pea, globose, 1-seeded.

Khandála, Párr Ghát, Máthérán and other gháts of this Presidency; also in those of Southern India, Bengal, Assam, Silhet, Burma, Ceylon, Malay Archipelago, China and Australia. This evergreen tree attains 25-50 ft. in height and 4-10 ft. in girth. Fl. February-March; Fr. April-June.

Wood very ornamental, red-brown, variegated with undulating lighter-coloured bands, heavy and close-grained. Used for rice-pounders, planks, etc. Polishes well, and is well adapted for cabinet-work and furniture.

COMBRETACEÆ.

Terminalia belerica, Roxb.; Dalz. & Gibs. Bby. Fl. 91; Brand. For. Fl. 222. *Bherdha, behedo, balra, bhaira, goting.*

Glabrous tree; young branchlets and calyx clothed with rusty pubescence. Leaves 3-6 in., crowded at the end of the branches, alternate, coriaceous, broadly-elliptic or obovate-elliptic, obtuse, retuse, or short-acuminate at the base, often unequal at the base, deciduous; petioles 1-2½ in. Bracteoles minute. Flowers small, grey or greenish-yellow with an offensive smell, arranged in simple solitary, axillary or infra-axillary spikes, 3-6 in., upper flowers of the spike male, lower hermaphrodite. Calyx pubescent with long rusty hairs inside. Fruit ½-¾ in. diam., ovoid, grey, when dry obscurely 5-angled.

Common in the plains and at the foot of the gháts throughout India and Malay Isles.

Alt. 2000 ft.

Attains 60-100 ft. in height and 8-20 ft. in girth. Sheds old leaves February-March, is covered with new in April. Fl. February-May; Fr. during the next rainy and cold seasons.

Wood light-grey and durable, used for planking, packing cases, etc. The fruit is the *beleric mirabolans* of commerce, and is used for dyeing cloth and leather and in making ink. The kernels are generally eaten by the natives, but when taken in large quantities they produce symptoms of narcotic poisoning. Oil is also expressed from them. A quantity of insipid gum, like gum-arabic, issues from wounds in the bark of this tree.

T. chebula, Retz.; Dalz. & Gibs. Bby. Fl. 91; Brand. For. Fl. 91. *Harda, hirda, har, harara, harla*

Timber Trees.

Young parts more or less rust-coloured or silvery-hairy. Leaves not clustered, mostly sub-opposite, ovate, or elliptic-ovate, acute and rounded at the base, 3-5 in., deciduous. Petiole 1½-2 in., often with 2 glands near the summit. Flowers all hermaphrodite, dull-white or yellowish, subtended with a downy bracteole, arranged in terminal, often panicled spikes, 2-4 in. long. Fruit ¾-1¼ in., ellipsoidal or obovoid from a cuneate base, more or less distinctly 5-angled.

Common all over India, up to nearly 5000 ft. at Mahábaleshvar, Ceylon, Burma, etc.
Alt. 2-5000 ft.

Attains 25-35 ft. in height, in favourable circumstances 80-100 ft. and 5-12 ft. in girth. Sheds its leves February-March, and is covered with new ones in April. Fl. May-June; Fr. in the next cold season.

The wood is yellowish-brown, hard, heavy and durable; used for building purposes, etc. It takes fine polish and is employed for furniture, carts. The dried ripe fruits are the black or *chebulic mirabolans* of commerce. They are ovoid, more or less furrowed longitudinally, and of a yellowish-brown colour. There are two chief varieties to be met with in the bázárs:—*Herda*, of a dark yellowish-brown colour, 1-1½ in. long; and *rangari herda* smaller, about ¾ in. long, of lighter colour. These fruits are extensively exported to Europe, and are valuable in the arts, as they contain a considerable amount of astringent principles. Bruised and immersed in water containing iron filings or salts of iron, they yield ink, and mixed with alum in solution, a good yellow dye. They are held in high repute as medicinal agents, and are a good substitute for galls in lotion. Six fruits are administered internally in dysentery, bleeding piles and in other diseases requiring tonic astringents. The unripe dried fruits are called *bala-harda*. They are ovoid, black, shrivelled bodies about ½ in. long, possessing the same properties as the ripe fruits, and are generally administered in the same cases—having been previously powdered in ghee or castor oil. Curious hollow round galls, about 1 in. in diameter, are found on the leaves of this tree, supposed to be caused by some unknown insect having deposited its ova there. They are very astringent, and are given in cases of infantile diarrhœa, and used in making ink, in dyeing and in tanning. They are known as *harda-phal* in the Deccan or *kadu ray* in Tam. The bark is also used in tanning.

T. citrina; **T. Gangetica,** Roxb.; and **T. tomentella,** Kurz., are believed to be mere varieties.

T. arjuna, Bedd.; Dalz. & Gibs. Bby. Fl. 91; Brand. For. Fl. 224.—*T. berryi,* Dalz. & Gibs. Bby. Fl. 91. *Anjan, jamla, kowa, arjun, arjuna-sadra.*

A large glabrous tree. Leaves 5-8 in., sub-opposite, coriaceous, glabrous when old, oblong or elliptic, often suddenly narrowed or cordate at the base, obtuse or acute at the apex; petiole about ½ in. or less, with 2 glands near its apex, or at the base of the leaf. Flowers dull-yellow disposed in pedunculate, terminal and axillary spikes, usually panicled. Bracteoles very small. Fruit 1-2 in. with 5-7, coriaceous, thick wings, truncate or narrowed at the summit, marked with ascending cross lines.

Found in the Deccan and the Sub-Himalayan tracts of North-West Provinces; also in Bengal, Oude and Southern India.
Attains the height of 60-80 ft.

Wood brown, variegated with darker-coloured streaks, very hard. It is not easy to work, and sometimes splits on seasoning. Used for carts, agricultural implements, etc. Timber Trees.

In this Presidency it is found in the North Konkan and Deccan, but is very common in the Southern Konkan in the vicinity of the banks of rivers. Also in the Sub-Himalayan tracts of the North-West Provinces and in Ceylon. Of great size in the Belgaum and Sunda forests. Attains 80-102 ft., generally 40-50 ft. in height and 10-20 ft. in girth. Is almost an evergreen tree. Fl. April-May; Fr. at the end of the rainy and in the cold seasons.

Wood dark-brown, very hard, used for carts, agricultural implements and building. The bark is in great repute as a tonic, and is administered internally in the form of decoction in atonic diarrhœa, and used as a local application to indolent ulcers.

Pentaptera angustifolia, Roxb., with narrow oblong leaves, is a variety of the last species.

T. tomentosa, Bedd.; Brand. For. Fl. 225.—*T. glabra var. tomentosa*, Dalz. & Gibs. Bby. Fl. 91. *Ain, asna, sag, sadri, marthi.*

Branchlets, young leaves, and inflorescence rusty-tomentose. Leaves 3-9 in., sub-opposite or alternate, elliptic, ovate or obovate-oblong, glabrous or hairy when old, coriaceous, cordate or suddenly narrowed at the base into short petioles, ½ in. with 2 glands near the base of the midrib. Flowers of a dull-yellow colour in panicled spikes. Bracteoles very small. Fruit 1-2 in., obovoid-oblong, wings broad, marked with prominent horizontal lines; edges of wings thin, irregularly crenulate.

Forests from Gujarát down to Konkan, Madras and Ceylon, Sátára and various parts of the Deccan. Also in Burma and Sub-Himalayan tract of the North-West Provinces.

Alt. 4000 ft.

Attains 80-100 ft. in height and 8-10 ft. in girth. Fl. April-May; Fr. January-April of the next year. Sheds its leaves January-March and renews them at the end of the hot season.

Wood hard and strong, much used in house-building, for making cart wheels and boats. It is an excellent fuel, and furnishes good charcoal. The bark is used for tanning, and the ashes (of the burnt bark) are said to be chewed with betel leaves. Potash is in some places prepared from them. Tassar silk-worm feeds on the leaves, and lac is sometimes formed in them. The flowers are often attacked by a species of cynips giving rise to numerous galls simulating fruits.

T. paniculata, Roth.; Dalz. & Gibs. Bby. Fl. 92; Brand. For. Fl. 226. *Kinjal, kindal.*

Young parts, inflorescence and bracts rusty-pubescent. Leaves 4-7 in., lower sub-opposite, upper alternate, coriaceous, nearly glabrous when old, oblong, elliptic, acuminate, cordate, generally with 2 sessile glands near the base of the midrib; petiole ½-¾ in. Spikes of reddish flowers very dense, terminal, forming compound panicles. Bracts ovate, acuminate, recurved. Calyx reddish, with long hairs within. Fruit ¼-½ in., brown-red, villous, with one broad wing about ½ in. and 2 smaller.

Common along the foot of the ghâts in the Southern Konkan to Cochin. Said to grow at Nilghiri and Coorg. Fl. August-October; Fr. ripens February-April, sometimes earlier.

Timber Trees.

Wood is said to be good and fairly durable, and is used for planks and posts, is inferior to that of *ain* and *marthi*.

T. catappa, Linn.; Dalz. & Gibs. Bby. Fl. Suppl. 33; Roxb. Fl. Ind. ii. 430. *Bengali badham.*

A handsome tree, branches whorled, horizontal, forming table-like tiers. Leaves 6-9 in., generally softly hairy when young, or glabrous, chartaceous, alternate, crowded at the end of branches, obovate, oblong, apiculate, base cordate or narrow-rounded with a depressed gland on each side of the midrib; petiole ¼-¾ in. Flowers small, greenish-white, forming solitary axillary spikes, shorter than the leaves. Bracteoles minute, lanceolate; the upper flowers male, the lower hermaphrodite. Fruit oval, or ellipsoid, compressed, with 2 elevated margins, 1-1½ in., rather convex on both sides.

Wild in Malaya, Moluccas (?) and extensively planted all over the tropics on hedges and gardens. Ascends 1000 ft., and attains 30-30 and in favourable situations 60-80 ft., with a girth of 6-8 ft. In Bombay almost evergreen—leaves which commence falling at the end of cold season are soon renewed.

Wood of a greyish-white colour, light, durable and much esteemed in Malabár, where the tree attains large size and is used for posts and various other purposes.

Anogeissus latifolia, Wall.; Brand. For. Fl. 227.—*Conocarpus latifolia,* Dalz. & Gibs. Bby. Fl. 91. *Dandua, dhavada, dhaura, bakli.*

A large tree with white smooth bark; branchlets and young leaves with soft, silky or rusty pubescence. Leaves 2-5 in., on petiole ½ in., coriaceous, ovate, or broad-elliptic, obtuse, retuse or emarginate. Flower heads in axillary racemes; peduncles one or more from the same axil, often branched. Bracteoles minute. Fruit very small, 2-winged, prickly, glabrous.

Mira Hills, Kennery and forests of the Konkan, and Madras to Ceylon. In the Sub-Himalayan forests to the Rávi.

Alt. 3000 ft.

Attains 30-50 ft., sometimes 80 ft. in height and 6-9 ft. in girth. Leafless during the whole of the cold season. And the new foliage appears in April-May. Fl. May-June (January-February, Roxb.); Fr. ripens November-February.

Wood close-grained, hard and tough, and used for cart axles, etc. It is useful as fuel, and yields good charcoal. From incisions made in the bark flows a white gum, similar to gum-arabic, which is employed in cloth-printing. The leaves are said to be used in tanning.

A. pendula, Brand. For. Fl. 229. *Kala-dhankra.*

Is a small tree or shrub with small glabrous leaves described from Deesa in this Presidency. Common in Rájputána.

Lumnitzera racemosa, Willd.; Dalz. & Gibs. Bby. Fl. 90; Brand. For. Fl. 221.

A glabrous tree or shrub. Leaves 1-3 in., sessile, coriaceous, veinless, entire or crenate, attenuated at the base, cuneate, obovate, retuse. Flowers small, white, in solitary, simple, axillary spikes, about as long as the leaves or shorter. Bracteoles minute. Stamens 10, alternately shorter, occasionally 5 (?). Fruit ½ in., ovoid.

Banks of salt-water creeks, Southern Konkan, Malabár and Sunderband, Ceylon and Australia. Timber Trees.

An evergreen tree 15-40 ft. high and 2-4 ft. in girth. Fl. in the hot season; Fr. October-November.

Wood said to be strong and durable, and used for posts and other building purposes.

Gyrocarpus Jacquini, Roxb. Fl. Ind. 1·445; Cor. Pl. t. 1; Bedd. Fl. Sylv. t. 196.

Branchlets and young leaves downy. Leaves 4-5 in. and almost as broad, broadly-ovate, entire, or slightly lobed, acuminate at the apex, truncate or cordate at the apex, rarely pubescent; clustered at the end of the branches; those of the young plants are larger, often 8-10 in., distinctly 3-lobed; petiole 1-4 in. Flowers small, greenish-yellow, unisexual, arranged in dense axillary cymes; peduncles 1-4, chiefly in the upper axils. Drupe ½-¾ in., ovoid, crowned with the elongate wing-like spathulate, calyx lobes 2-2½ in., coriaceous.

Common in the Deccan, ascending 1000 ft. on the banks of the Krishna River, near Nalativad. Bengal, Malay and the tropics. Attains 40-60 ft. in height and 4-8 ft. in girth. Fl. July-September; Fr. November-February.

Wood said to be white, coarse-grained, very light and soft; fit only for boxes, toys, etc.

MYRTACEÆ.

Eugenia jambolana, Lam.; Brand. For. Fl. 233.—*Syzygium jambolanum*, Dalz. & Gibs. Bby. Fl. 93. *Jambul, jam*

Glabrous. Leaves 3-6 in., coriaceous, smooth, shining, entire, ovate, or oblong-lanceolate, more or less acuminate, penninerved, the numerous nerves uniting within the margin; petiole ½-1 in. Flowers numerous, greenish-white, odorous, in short and compact panicled cymes, usually lateral on the previous year's branches, occasionally axillary, or terminal. Calyx tube funnel-shaped, truncate or obscurely lobed. Petals cohering and falling off in a calyptra. Berry oblong or sub-globose, ¼-1 in., crowned with the base of the calyx, purple, succulent when ripe.

Common throughout India, Ceylon, Malay Archipelago to Australia ascending to 5000 ft. Attains 30-80 ft. in height and 5-12 ft. in girth. An evergreen tree, renewing its leaves in the hot season, whilst the old ones are falling off. Fl. February-March; Fr. April-June.

Wood reddish-brown, tough, hard, and excellent for building and agricultural implements. The bark is astringent, and in the form of decoction is administered in chronic dysentery. It also yields an extract, like gum kino, which is used for dyeing and tanning. The fruit has a sweetish taste, and is much eaten by the natives, and also by birds and bats. From its juice a pleasant syrup is prepared, which acts as a good aperient in chronic diarrhœa. Vinegar for domestic use is also prepared from it by some people at Mahábaleshvar.

Jambul tree is very variable in the shape of its leaves, the size of its fruit and the height. The following are its chief varieties.

E. caryophyllifolia, with ovate-lanceolate, long, acuminate leaves and globose fruit size of a pea. This form prevails chiefly at Mahábaleshvar. *E. obtusifolia* with obtuse leaves and large oblong fruit. This variety is more frequently seen in the Konkan.

Timber Trees.

Other species belonging to this genus are chiefly seen growing over the higher ghâts. Some are very handsome, such as *E. rubicunda*, *E. Zeylanica*, with cymes of white flowers, *E. læta* with cymes of large crimson or purple flowers, *E. caryophyllæa*, yielding an edible fruit, etc.

E. jambos and *E. malaccenses* are cultivated for the beauty of the foliage and flowers. The fruit is not of good flavour.

The wood of some of these is brown-red, but all of them are small trees, used in the construction of huts or for fuel.

E. Stocksii is a lofty tree with large, oblong, or elliptic-obovate leaves and dense axillary and lateral cymes of small flowers.

Barringtonia racemosa, Blume; Dalz. & Gibs. Bby. Fl. 94. *Karpa.*

Glabrous. Leaves 10 by 3 in., cuneate, oblong, or cuneate-lanceolate, coriaceous, crenulate, shortly acuminate, rounded at the base, petiole ⅛-¼ in. Flowers showy, pink or pale-rose-coloured, on slender pedicels ¼-⅛ in., forming lax pendulous racemes, 12-18 in., arising laterally from the ends of the branchlets. Calyx tube, turbinate, lobes ovate. Fruit ovoid-oblong, 1¾ by 1-½ in., obscurely quadrangular when ripe, smooth.

Konkan, in the Severndurg Táluka, in Madras about the coast, and from Sunderband to Malacca and the Andamans.

Attains 40-50 ft. height and 4-5 ft. girth. An evergreen tree. Fl. March-April; Fr. May-July.

The wood is like that of the following species:—

B. acutangula, Gærtn.; Dalz. & Gibs. Bby. Fl. 95; Brand. For. Fl. 225. *Ingar, ijal, samandar-phal, tuwar, kanapa chethi.*

Glabrous. Leaves 3-5 by 2 in., short-petioled, cuneate-elliptic or obovate-oblong, entire or serrulate, coriaceous, occasionally pubescent. Flowers pink, smaller than in the preceding species, arranged in long, often about 1 foot pendulous racemes at the ends of the branches, sometimes downy. Calyx 4-cornered, the limb 4-lobed. Petals 4, pink, ¼ in. Filaments long, red. Fruit 1-1½ by ½ in., oblong, 4 angled; angles rounded.

Common on the banks of streams in the Konkan, Malabár, Burma, Bengal, Ceylon, and all over India, Singapore, Australia and the Malay Isles.

Attains 40-50 ft. height and 4-6 ft. girth. An evergreen tree. Fl. April-May; Fr. rainy season.

Wood reddish-brown, close-grained, hard, tough and strong. Used for boat-building, carts, etc. Pounded bark is employed for catching fish. The fruit rubbed in water is administered as an emetic.

Careya arborea, Roxb.; Dalz. & Gibs. Bby. Fl. 95; Brand. For. Fl. 236. *Kumbia, kumbi, waikumba.*

Wholly glabrous. Leaves 6-12 by 4-6 in., oblong, obovate or orbicular, membranous, sessile or very short-petioled, crenate-denticulate, obtuse or shortly acute. Flowers 2-2½ in. diam., white with purple filaments, subtended by 3 unequal bracts arranged in short spikes, with an unpleasant smell. Calyx campanulate. Fruit 2½ by 2 in., globose, and crowned with the persistent calyx-tube.

Very common in the Southern Konkan and Indápur. Also in Madras, Bengal and Burma. From Himalaya to Travancore and Tenasserim. Alt. 4000 ft. **Timber Trees.**

Attains 30-60 ft. height and 5-8 ft. girth. Sheds leaves during the early part of the hot season, and is soon covered with new leaves (March-April). Fl. March-April; Fr. May-July.

Wood red or reddish-brown, beautifully mottled, close and even-grained, strong, and used for cart-building. Takes fine polish, and is good for cabinet-work and furniture. Strong cordage is made from the fibres of the bark and also matches for matchlock men. The bark is said to be used for tanning in some parts of India.

Psidium Guyava, Linn.; Brand. For. Fl. 232.—*P. pyriferum,* Dalz. & Gibs. Bby. Fl. Suppl. 34.

This is the *guava* tree, *Amrud*; indigenous in Mexico and West Indies and naturalized throughout India.

Grows to be a tree 20-30 ft. high and 2-3 in. in girth. Evergreen. Fl. April-May; Fr. rainy season. In some places it flowers all the year round.

Wood very hard, close-grained, takes a fine polish, and is excellent for carpentry, and the bark for tanning the leather.

LYTHRACEÆ.

Lagerstrœmia parviflora, Linn.; Dalz. & Gibs. Bby. Fl. 98; Brand. For. Fl. 239. *Nanch, daura, sida, lendi, bandarah, kakrio.*

Glabrous; branchlets and young leaves are pubescent, at least on midrib. Leaves 2-3½ in., oblong, opposite, coriaceous, sessile, or shortly-petiolate, rounded at the base, acute or acuminate-obtuse, glaucous beneath. Flowers white, fragrant, ¼-½ diam., on slender pedicels, forming lax axillary or terminal panicles. Calyx glabrous or minutely-downy; not ribbed; lobes 6-7, ultimately erect, adpressed to the fruit. Petals clawed, crumpled. The 6 outer stamens much longer than the inner ones. Capsule oblong or obovate-oblong, ½-1 in. long; 3-4 celled. Seeds with a terminal wing.

Common; from Gujarát to the Konkan, ascending up to the valleys of Mahábaleshvar,

Alt. more than 4000 ft.

Common in Central and Southern India, Bundelkund, Behár and at the base of the Western Himalaya.

Attains 50-70 ft. in height and 6-8 ft. in girth. Bark white. Fl. April-June; Fr. rainy season. Sheds leaves March-April, and renews them in May.

The wood, called *bentek,* is light-brown or reddish, strong, tough and durable, takes a fine polish, and is used for ploughs, buggy-shafts, etc. The bark and leaves are used for tanning, and the gum which exudes from the bark is said to be sweet and edible.

L. lanceolata, Wall.; Dalz. & Gibs. Bby. Fl. 98; Brand. For. Fl. 240. *Bandara, bandaga, nandi, nani, sokutia, boda.*

Leaves 3 in., ovate, or elliptic-lanceolate, acuminate, narrowed at the base into a petiole ¼-½ in., glabrous, white beneath. Flowers white, larger than in the last species, in lax compound panicles. Pedicels slender and downy. Calyx sometimes white-tomentose, not ribbed; lobes finally patent or reflexed. Capsule smaller than that of *L. parviflora,* usually about ⅜-½ in., very hard.

Common in the forests of our ghâts from Khándesh, Deccan to Sávantvádi, Malabár Coast to Travancore.

Timber Trees.

Attains 30-50 ft. and a girth of 4-5 ft. Fl. April-May; Fr. in the rainy season. Wood red, moderately hard.

L. flos-reginæ, Retz.; *(L. reginæ)*, Dalz. & Gibs. Bby. Fl. 98; Brand. For. Fl. 240. *Motta-bandara, taman.*

Glabrous, sometimes with a few scattered straight spines 1-3 in. on old trunk and branches. Leaves 4-9 in., broad-elliptic or oblong-lanceolate, obtuse, entire, coriaceous, on a petiole ¼-½ in. Flowers 2-2½ diam., showy, lilac, on thick arhitish pedicels, forming large, not dense, panicles. Calyx clothed with white or tawny tomentum, 12-14-ribbed. Petals waved. Stamens all equal in length. Capsule oblong ½-¼ in., 6-celled. Seeds brown with a lateral wing.

Common in the Deccan, Nagotna, Ratnágiri, Vengúrla and the Western forests of Southern India, Assam, Ceylon, Malacca and China.

Attains 50-60 ft. and a girth of 6-12 ft., ascending to 2000 ft. Fl. May-July; Fr. cold season. Leafless during the hot season.

Wood of a red or whitish colour, rather heavy, close-grained and strong; takes a good polish. It is extensively used for ship-building in Chittagong and Burma, and for carts, boats, planks, etc.

Punica granatum, Linn.; Dalz. & Gibs. Bby. Fl. Suppl. 34; Brand. For. Fl. 241. Pomegranate, *dalim, anár.*

The wood is of a whitish colour, hard, heavy, and takes a fine polish. The bark of the root is an effective remedy for tape-worm, and with it Morocco leather is tanned and dyed. The rind of the fruit is administered in diarrhœa and chronic dysentery, and also used as dye and tan stuff. From the flowers a red dye is prepared.

Sonneratia apetala, Ham.; Roxb. Fl. Ind. ii. 506; W. & A. Prod. 327.

A glabrous tree with drooping branches. Leaves 3-4 by 1-1¼ in., oblong-lanceolate, or linear-lanceolate, obtuse, attenuated at the base on a petiole ¼ in., coriaceous, pale-green. Flowers whitish, about 1 in. diam. Pedicel 1 in., terete or angular, arising from the end of branchlets. Calyx ¾ in., lobes 4, oblong, acute. Petals none. Filaments as long as the calyx-lobes. Style included or scarcely exert; stigma large, capitate. Capsule broader than high, 4-6-celled, with the calyx at the base.

Found at Sewri and in the Konkan in salt marshes. Common at Sunderband, back-waters of Travancore, Transgangetic Peninsula to Moulmein.

Is an evergreen tree; attains 40-50 ft. with a girth of 3-5 ft. In some places it is a stunted shrub. Fl. June-July; Fr. August-October.

Wood reddish-brown, coarse-grained, strong and hard.

S. acida, Linn.; Dalz. & Gibs. Bby. Fl. 98; Brand. For. Fl. 242.

A small glabrous tree or shrub with drooping branches. Leaves 3-4 by 1-1¾ in., obovate, or broadly-ovate, attenuated into a broad but very short petiole, obtuse or retuse, entire, coriaceous. Flowers about 2 in. diam., reddish or purplish, on very short peduncles, solitary at the ends of branchlets. Calyx about 1 in., not ribbed, 6-8 lobed. Petals linear, acute. Style long-exerted. Capsule 2-2½ in. broad, concave at the top, many celled.

In salt marshes in Sálsette, Ratnágiri, Vengúrla and all along the Western Coast, Sunderband, Travancore, Ceylon, Burma, Java, Pegu and Siam. Timber Trees.

Attains 10-15 ft. in height. Fl. in the beginning of the rains, probably nearly all the year round; Fr. cold season. Wood soft and light, used as fuel.

SAMYDACEÆ.

Casearia graveolens, Dalz. & Gibs. Bby. Fl. 11; Brand. For. Fl. 243. *Naro, nahraw, chilla, pimpri.*

A shrub or tree, glabrous. Leaves 3-8 by 1-2 in., broad-elliptic, short-acuminate, or obtuse, crenate-dentate, narrow and rounded at the base, on a petiole ¼ in. Flowers numerous, green, with a disagreeable odour, clustered in the axils of the leaves; pedicels short, about ¼ in., articulated above the base, pubescent below the articulation. Calyx lobes 5, sometimes pubescent. Petal none. Stamens 8, alternating with scalelike staminodes. Fruit ¾ in., oblong-ellipsoid, 3-valved.

In the Konkan, Karanja, Rájápur, valleys of Mahábaleshvar, Mátherán (?) and Western Gháts of Madras, Garwhal, Kumaon, Burma and Sikkim.

Attains 20 ft. in height and 12-15 in. in circumference, ascending up to 5000 ft. Fl. March-April; Fr. in the rainy season. Sheds leaves March-April, and these are renewed in May.

Wood light-yellow, close-grained. The fruit is used for poisoning fish.

Casearia tomentosa, Roxb.; Brand. For. Fl. 243.—*C. anavinga*, Dalz. & Gibs. Bby. Fl. 11; Brand. For. Fl. 243. *Lainja, massei, karei, chilla, bhari* (Punj. name).

Branchlets tomentose or nearly glabrous. Leaves 4 by 1½ in., tomentose, pubescent, or scantily hairy at the base of the midrib, ovate, elliptic-oblong or lanceolate, serrulate, or nearly entire, somewhat unequal and rounded at the base. Flowers small, numerous, greenish-yellow, on pedicels ¼ in., in dense axillary fascicles. Stamens 7-10. Staminodes hairy, alternating with the calyx lobes. Fruit ovoid, ¾ in., 3-valved. Seeds imbedded in a red soft arillus.

Karanja, Rájápur, Mátherán (?), valleys of Mahábaleshvar. Throughout India, Ceylon, Malaya and North Australia.

Attains 25-35 ft. in height, in some places higher, with a girth of 4-7 ft. Fl. February-May. Sheds leaves January-March, and new foliage appears March-April.

Wood whitish, soft, and used for making combs and small wood-work. The milky juice of the fruit is employed for poisoning fish, and the pounded bark for adulterating the *kamilla* powder of *Mallotus Philippinensis*.

Homalium Zeylanicum, Benth.; Dalz. & Gibs. Bby. Fl. 53; Bedd. Fl. Sylv. t. 210.

Leaves 3-4 by 2 in., ovate-elliptic, or ovate, obtusely-acuminate, narrowed at both ends, crenate, shining, glabrous. On a small petiole, about ⅜ in. Flowers numerous, small, white, on small slender pedicels, about ⅛ in., arranged in dense axillary racemes, usually clustered at the ends of branchlets. Calyx tube oblong, 4-5-divided. Styles 3-4. Capsule coriaceous, dehiscing partially, 3-4-valved.

From Rám Ghát to the forests of Malabár and Ceylon, ascending 4000 ft. alt.

Attains 40-50 ft. in height.

Timber Trees.

DATISCACEÆ.

Tetrameles nudiflora, R. Br.; Brand. For. Fl. 245; D. C. Prod. xv. pt. I. 411; Bedd. Fl. Sylv. t. 212. *Jungly-bendi* (name given to *Thespesia populnea*).

Leaves 5-6 by 4-5 in., rotundate, or ovate, acute, or shortly-acuminate, rounded at the base, serrate, or almost entire, sometimes obsoletely 3-lobed, membranous, pubescent when young, glabrescent when old. Flowers small, apetalous, diœcious, greenish-yellow, calyx usually 4-fid; styles 4. Male flowers in erect panicles, clustered at the end of branches. Female in elongate, pendulous racemes. Capsule ovoid, very small, glandular-viscid, dehiscent at the top.

At Párr Ghát and the forests from Bombay to Ceylon, Burma, Tenasserim, Andamans, and Sikkim—ascending 2000 ft.

Attains 100-150 ft. in height and 10-15 in circumference. Fl. February-March; Fr. May-June. It sheds its leaves at the beginning of the hot season, and begins to renew the foliage in May.

Wood brownish-light, soft, coarse, and loose-grained—not durable.

CORNACEÆ.

Alangium Lamarckii, Thwaites; Dalz. & Gibs. Bby. Fl. 109; Brand. For. Fl. 250. *Ankul, ankola* or *akola, alangi.*

A shrub or small tree with branches often spinescent. Leaves 3-6 by 1-2 in., membranous, oblong or elliptic, obtuse, acute, or acuminate, somewhat rounded and unequal at the base, pubescent or tomentose when young, glabrous when old, or more or less pubescent below, often with scattered hair, hollow glands in the axils of the veins; petiole hairy or villous. Flowers white, hermaphrodite on short bracteate pedicels, solitary or fasciculate in the axils or above the scars of the fallen leaves. Calyx 5-10-toothed. Petals 5-10, ½-1¼ in. Pedicels, calyx and petals wooly. Stamens about 20-30. Stigma large. Fruit oblong, ⅓-½ in., black, crowned by the calyx limb.

Grows in the island of Elephanta, Virdi jungles, Deccan and Konkan; not uncommon all over India.

Attains 20-40 ft. in height and 2-3 ft. in girth.

Fl. usually February-April, sometimes in January; Fr. May-August. It is an almost evergreen tree; renews foliage April-May.

Wood is ornamental, yellowish-brown, and often dark-coloured in the centre; also close-grained, tough and strong, with a glossy surface, easily worked. It yields excellent fuel. The fruit is sweet, somewhat astringent and acid, and is eaten. Leaves are used as poultices in rheumatic pains, and boiled in oil are applied to indolent ulcers. The juice of the aromatic root is reckoned anthelmintic, purgative and an antidote to snake-bites.

Mastixia arborea, C. B. Clarke; Bedd. Fl. Sylv. t. 216.—*Bursinopetalum arboreum,* Dalz. & Gibs. Bby. Fl. 28.

Leaves 2-3 by 1½-2 in., alternate, elliptic-oblong, acute or suddenly acuminated, narrow at the base, glabrous, coriaceous, entire, dark-green, becoming dark on drying, on petiole ½-1 in. Flowers small, white, in terminal pubescent panicles. Calyx campanulate; segments 5, triangular-lanceolate. Petals 5, ovate-acute, leathery. Stamens 5, alternate with the petals. Ovary adhering to tube of calyx, 1-celled, with 1 pendulous ovule. Fruit drupaceous, ovoid, size of a plum.

Parvar Ghát, Nilghiries, Sisparah and Ceylon.
Alt. 4-7000 ft.
Fl. April-June; Fr. in the cold season. Leafless December-January; new leaves appear February-March.
Wood is said to be good, but its uses are not known.

RUBIACEÆ.

Anthocephalus cadamba, Miq; Brand. For. Fl. 261.—*Nauclea cadamba*, Dalz. & Gibs. Bby. Fl. Suppl. 43. *Nhew, nepa, kadam.*

Branches horizontal. Leaves 5-9 in., ovate-oblong, or elliptic-oblong, coriaceous, glabrous, and shining above, pubescent beneath, acuminate, cordate or rounded at the base, on a short petiole; stipules lanceolate-deciduous. Flowers orange-coloured, scented, sessile, with large, white, exserted stigmas, arranged in terminal, globose, peduncled heads, 1-1½ in. diam.; peduncle 1-1½ in. Bracteoles none. Fruit yellow, size of a small orange.

Common about villages in the Southern Konkan, Poladpore: Bombay, rare, and one or two trees at Mahábaleshvar, probably planted. Wild and cultivated from Himalaya to Ceylon, Malacca and Pegu.

A glabrous tree 40-70 ft. high, with 6-15 ft. in girth. Fl. May-June; Fr. August-October.

Wood light-yellow, used for furniture and building, but suffers from the attacks of insects. The flowers are offered in Hindu shrines. The fruit is eaten, but is not palatable.

Adina cordifolia, Hook.; Brand. For. Fl. 263, t.33.—*Nauclea cordifolia* Dalz. & Gibs. Bby. Fl. 118. *Hedu, haldu, heddi.*

Young parts pubescent. Leaves 4-12 by 3-9 in., coriaceous, pubescent beneath, cordate, abruptly acuminate, petiole 2-3 in., thick; stipules orbicular or oblong, deciduous. Flowers yellowish, in heads ¾-1 in. diam.; peduncles 1-2 in., axillary, solitary, or 2-3, each bearing one head; bracts small; corolla downy, style long-exserted; stigma clavate. Fruit-head consists of numerous capsules, ⅛ in., dehiscing from the base.

Common throughout the Konkan; and from Kumaon to Sikkim, Pegu, Tenasserim, Madras and Ceylon.
Alt. 3000 ft.

A large tree 40-80 ft. high with 4-15 in girth. Fl. June-July; fruit ripens December-March. Sheds leaves in the hot season, and is covered with new foliage very soon.

It furnishes a yellow wood, which works easily and takes a fine polish and is good for turning. It is used for furniture, opium boxes, combs, etc., but is said to decay soon when exposed to wet.

Stephegyne parvifolia, Korth; Brand. For. Fl. 262.—*Nauclea parviflora*, Dalz. & Gibs. Bby. Fl. 118. *Kaddam, kangei, kalam, kadamb.*

Glabrous or pubescent. Leaves usually 2-6 in., extremely variable in size, rotundate, oblong, ovate, or obovate, cordate at the base, on short petioles, obtuse, acute, or acuminate, deciduous; stipules obovate. Flowers small, yellow, sessile, in dense heads, about 1 in. diam., on peduncles ½-3 in., supported by 2 linear-oblong leaf-like bracts, arranged in terminal and axillary panicles. Bracteoles spatulate. Capsules ⅛ in., ovoid.

In the Konkan and the Mával District. Common throughout India, Ceylon and Burma.
Alt. 4000 ft.

Timber Trees.

Attains 40-80 ft. in height and 6-12 in circumference. Fl. May-July; Fr. November-December. Leafless for a short time, February-March.

Wood light-red in colour and close-grained, and is used for building, making gun-stocks, combs, etc., but is said to rot if exposed to wet. The leaves are used as fodder.

Nauclea purpurea, Roxb. Fl. Ind. i. 515; Cor. Pl. 41 t. 54; Hook. Fl. Ind. iii. 26; Brand. For. Fl. 262. *Bagada-toling, dav panas.*

A glabrous small tree with ash-coloured trunk. Leaves 4-9 by 1½-5 in., membranous-elliptic or elliptic-lanceolate, sub-acute, narrowed at the base, entire, smooth, and shining on both sides, on a petiole ½-1½ in. Flowers purple in globose heads, 1½ in. diam., on terminal peduncles, about 2-3 in. long. Stigma capitate. Ovary 2-celled; capsule of two dehiscent cocci opening from the base. Seeds minute, numerous.

In the forests of the Konkan, Malabár, Cranganor, Circars, etc. Rare.

Fl. in April. The fruit remains long on the tree for months. Wood pale-yellow, or brownish; close-grained.

Nauclea missionis, Wall.; W. & Arn. Prod. 392; Hook. Fl. Ind. ii. 27—*N. elliptica*, Dalz. & Gibs. Bby. Fl. 118. *Phuga.*

Leaves 4-7 by 1½-2½ in., almost sessile, glabrous, oblong, or elliptic-lanceolate, acute or obtuse, membranous or coriaceous, glabrous, shining above, on a petiole ¼-½ in., usually winged; stipules arranged in an oppressed cylindric sheath, more or less connate below, persistent. Flowers small, yellowish-white, on axillary and terminal, stout, short peduncles, each bearing a globose head, 1 in. diam., four unequal bracteoles, united into a cup above the base. Calyx and corolla tomentose. Stigma long exserted, cylindric.

Konkan, near Sura and the village of Hulan, not far from Chorla Ghát; Malabár and Travancore.

The wood is of a light chestnut colour, and valuable for furniture.

Hymenodictyon excelsum, Wall.; Dalz. & Gibs. Bby. Fl. 117; Brand. For. Fl. 267. *Kadwah, kudyi, bhaulan, phaldu, bhoursal.*

A large pubescent tree. Leaves 4-10 by 3-5 in., ovate-elliptic, or elliptic-oblong, or almost orbicular, suddenly acuminate, pubescent on both surfaces, membranous; nerves 7-10 pair; petiole 1-3 in.; stipules broad, cordate, recurved. Floral leaves long-petioled, 3-5 in. Flowers greenish-white, fragrant, numerous, arranged in large spreading compound panicles. Calyx 1½ in.; corolla ⅙ in., infundibuliform. Capsules ⅜-¾ in. on recurved pedicels.

Along the ghâts in this Presidency; base of the Himalayas from Garwhal to Nepaul ascending to 2500 ft.; throughout the Deccan and Central India to the Annamallays, and in Tenasserim and Chittagong; also in Java.

Alt. 5500 ft.

Attains 30-50 ft. in height and 6-8 ft. in girth, but in higher altitudes becomes bushy. Fl. June-July ripens; fruit October-January. Leafless November-June.

The wood is light-coloured, soft, close-grained, and is used for agricultural implements, palanquins, toys and similar articles. The inner

bark possesses the bitterness of Cinchona, and is used as a febrifuge; it is also employed in tanning. The leaves are useful as fodder. Timber Trees.

H. obovatum, Wall.; Dalz. & Gibs. Bby. Fl. 117; Brand. For. Fl. 268. *Kadwai* (bitterness), *sirid*.

A large tree. Leaves 4 by 2-2½ in., crowded at the apex of the branches, elliptic or broadly-obovate, abruptly-acuminate, glabrous on both sides, or sometimes pubescent beneath, finely reticulate, 6-8 pair of nerves, narrowed into a petiole 1½-2 in.; stipules ovate-oblong, glandular-serrate. Flowers small, greenish, in spiciform terminal racemes, several together, each generally furnished with a coloured floral leaf. Calyx hairy. Capsule erect.

Island of Karanja, Rám and other ghâts down to Travancore.
Alt. 4000 ft.
Is evergreen. Fl. during the rainy season, and the fruit remains on the tree for a long time.
The wood is said to be equal to that of the last species.

Randia uliginosa, D. C. Prodr.; Dalz. & Gibs. Bby. Fl. 119; Brand. For. Fl. 273. *Kaurio, telphetru, pindra, panar, katul*.

A glabrous armed tree with rigid, straight, 4-sided branches. Spines short, straight, or none. Leaves 2-8 by 1-4 in., obovate or oblong, obtuse, shining, cuneate at the base; petiole short and slender; stipules triangular. Flowers solitary, white or cream-coloured, fragrant, either large and sessile, or small and peduncled; corolla of the large form 1-2 in. diam.; lobes rounded; mouth of the tube closed with a ring of white hairs; of the small form the tube is glabrous within. Berry 2 in. long, yellow, crowned with the persistent calyx, 2-celled, ellipsoid. Seeds compressed, smooth.

In the Southern Marátha Country and Konkan; also in Eastern and Central India, Sikkim and Assam.
Alt. 2500 ft.
Attains a height of 15-20 ft. and a girth of 2 ft. Fl. in May-June; Fr. December-February. Leaves shed February; renewed April.
Wood whitish, close-grained, and hard. The fruit which is sold in the bázárs is eaten either cooked or roasted. The leaves serve as fodder for cattle.

Randia dumetorum, Lamk.; Dalz. & Gibs. Bby. Fl. 119; Brand. For. Fl. 273. *Ghela, galay, mainphul, karhar, arar*.

A tall shrub or small tree, spines horizontal, often long and rigid, 1-1½ in. Leaves 1-2 by 1, obovate, glabrous or pubescent, obtuse or sub-acute, from cuneate base, narrowed into a short petiole; stipules ovate-acuminate. Flower white, soon becoming yellow, fragrant, solitary, rarely 2-3, on short peduncles at the end of short lateral branchlets. Calyx strigose, with stiff adpressed hairs. Corolla ½-¾ in. diam.; divisions oval or oblong. Berry globose or ovoid, ¾-1½ in. long, glabrous or pubescent, yellowish when ripe. Seed imbedded in pulp, compressed.

R. longispina (Dalz. & Gibs. Bby. Fl. 119) is probably the same species with rather sub-acute leaves.

Very common on our ghâts and throughout India.
Alt. 4-5000 ft.

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Attains 15-20 ft. height with 2-4 ft. girth. Fl. March-May; Fr. during the rains. Leaves shed February-April; new foliage, April-May. Is rarely, if at all, leafless at Mahábaleshvar and Mátherán.

The wood is of a light-brown colour, even-grained, heavy and strong, but liable to warp. It is used for agricultural implements, combs, as also for fuel. The ripe fresh fruit is roasted and eaten (Brandis). It is soapy, but destroys the cloth, and is, therefore, useless for washing purposes. The dried ripe fruit is held in esteem by the hakims for its emetic properties; the dose is one ripe fruit in powder. The unripe fruit, bruised and pounded, is used to poison fish. The leaves are used as fodder for cattle.

Gardenia lucida, Roxb.; Dalz. & Gibs. Bby. Fl. 120; Brand. For. Fl. 271. *Dikamali, karanji.*

A glabrous, unarmed, large shrub or small tree with resinous buds. Leaves 3-10 by 2-5 in., elliptic, oblong, obtuse or sub-acute, narrowed into short marginate petiole, shining, many-nerved,—nerves 20-30 pair; stipules large, connate. Flowers white, becoming yellow, solitary, fragrant, on pedicels 1½ in. from the axils of the uppermost leaves. Calyx variable. Corolla tube 1½-2 in., limb 1½-3 in. diam.; divisions 5, oblong, stigma entire. Fruit oblong or ovoid, smooth, crowned with the persistent calyx.

Common in the Southern Marátha Country and the Konkan, Chittagong, Burma, Southern India, and Central Provinces. Cultivated in gardens in Bombay.

Height 20 ft. with a girth of 3 ft. Fl. March-June; Fr. in the cold season.

The wood is close-grained, hard; used for combs and turning. This as well as *G. gummifera* furnish the *Dikamala* resin which exudes from the wounded bark. As sold in the bázárs it is hard, opaque, greenish-yellow, of a repulsive odour, and is used in the treatment of sores and in cutaneous diseases. It is much employed by farriers to kill maggots in the sloughing sores of cattle.

G. gummifera, Linn.; Dalz. & Gibs. Bby. Fl. 120; Brand. For. Fl. 270. *Dikamali, kamari.*

A tall, glabrous, unarmed shrub or small tree; buds resinous. Leaves 1½-3 in., with 15-20 pair of nerves, sessile, or sub-sessile, obovate-oblong, acute or obtuse, with cordate base, coriaceous, shining, occasionally puberulous beneath. Stipules sheathing, truncate or mucronate. Flowers sub-sessile, white, fragrant, terminal, 1-3 together. Corolla tube 1½-2 in., glabrous or pubescent; limb 1-3 in. diam.; divisions 5, narrow, oblong, obtuse. Fruit oblong, 1-1½ in., small, crowned with the persistent calyx. Pericarp, thin, crustaceous; endocarp 4-5-valved.

In Dhárwár (dry plains), Dadi on the Ghatparba; also in Ceylon, Madras, and Sátpura range.

Fl. March-April; Fr. during the rains. Leafless during the hot season.

Wood white and hard, with uses similar to those of the preceding. Fruit edible.

G. latifolia, Ait.; Dalz. & Gibs. Bby. Fl. 120; Brand. For. Fl. 271. *Pandru papura, kariga, phiphar, ghogar, gogarli.*

A tree with resinous branchlets. Leaves 4-8 in. and sometimes almost as broad, opposite or in threes, large, broadly-elliptic, ovate

or orbicular, obtuse, narrowed into short petiole, glabrous or pubescent beneath; nerves about 12 pair with hairy glands in the axils of the nerves beneath; stipules large, connate, often toothed. Flowers terminal, generally solitary, sometimes binate, nearly sessile, white, soon changing to yellow, fragrant. Calyx divisions 5-9, unequal, recurved. Corolla tube 2-3 in., pubescent or hirsute on the outside, limb 2-4½ in. diam., lobes 5-9, obliquely-obovate. Stigma thick. Fruit nearly globose, 1-2 in. diam., greenish or greenish-yellow, crowned by the calyx limb.

In Khándesh jungles, Nagotna, Thull Ghát, and throughout India. Alt. 3000 ft.

Attains 20-30 ft. height and 3-4 ft. girth. Fl. April-May; Fr. in the cold season. Leafless during the cold season; leaves renewed in May. The timber is white, durable, close-grained, and easily worked. It is valuable for engraving, and tanners' work.

G. montana, Roxb.; Dalz. & Gibs. Bby. Fl. 120.

This is a small plant, said to be a variety of *G. turgida*, very rare in this Presidency, being only met with in the Atavesi.

The wood is close-grained, but is apt to warp.

Canthium umbellatum, Wight; Dalz. & Gibs. Bby. Fl. 113. —*Plectronia didyma*, Brand. For. Fl. 276. *Arsul.*

A beautiful evergreen tree, unarmed, glabrous; branchlets 4-sided. Leaves 2-6 by 2-4 in., oval, elliptic-obtuse or obtusely acuminate, dark-green, coriaceous; nerve-axils glandular; stipules triangular. Flowers white, fragrant, in axillary umbels on short, very stout, compressed peduncle. Corolla segments 5; tube hairy inside. Fruit ¼-½ in., broad, oblong, compressed, almost didymous, on slender pedicels. Putamen rugose.

Pretty common in stony places above the ghâts.

Alt. 4000 ft.

Attains a height of 30-50 ft.

The timber is of a light chocolate colour, but black in the centre, close-grained and hard.

Vangueria spinosa, Roxb. Fl. Ind. i. 536. *Alu* (name given also to *Colocasia*).

A small tree or tall shrub armed with straight, opposite, simple or 3-nate sharp spines. Leaves 3-4 in., opposite or 3-nately whorled, entire or membranous, ovate, elliptic or ovate-oblong, acute or acuminate, glabrous or tomentose on a petiole ⅛-1 in. Flowers small, greenish, very short-pedicelled, arranged in shortly peduncled cymes. Calyx 5-toothed. Stigma 4-5-lobed. Drupe ⅜-1 in. diam., globular or terminate, yellowish, fleshy. Pyrenes 4-5, smooth.

Common on the ghâts and throughout the Konkan, Khándesh, Bengal, Tenasserim and Burma.

Fl. in January-February. The fruit is eaten cooked or roasted, but is not palatable.

Another allied species, *V. edulis*, a native of Madagascar, is sometimes cultivated in gardens for the sake of its fruit.

Timber Trees.

Ixora parviflora, Vahl.; Dalz. & Gibs. Bby. Fl. 113; Brand. For. Fl. 275. *Kurat, lokandi, rar-kurat, rai-kura, guavi-lakdi, kota-gandal.*

A small evergreen tree, glabrous, or the inflorescence pubescent. Leaves 3-6 by 1½-2½ in., coriaceous, short-petioled, oblong or elliptic-obtuse, with rounded or corded base; nerves slender, about 10 pairs; venules prominently reticulate. Stipules triangular. Flowers white or pink, ⅓-½ in., odorous, sessile or pedicelled, arranged in branched cymes. Fruit small, didymous. Seed plano-convex.

Common on our ghâts and all over Southern India, extending northwards to the Sátpura range. Attains 25-30 ft. height and 2-3 ft. girth. Fl. February-March.

The wood is of a reddish-brown colour, hard, close-grained, easily worked, and stands a good polish; employed for furniture, building purposes and fuel. The green make excellent torches, which are frequently used by dâk-runners.

Morinda citrifolia, Linn.; Dalz. & Gibs. Bby. Fl. 114. *Aal, bartundi.*

A small glabrous tree with 4-angled branchlets. Leaves usually 6-10 in., short-petioled, shining, oval-oblong or broadly elliptic, acuminate, acute or obtuse, one of the pair next the peduncle often absent. Stipules large, broader than long, or semilunar, entire or 2-3 fid. Flowers white, small, fragrant, in globose heads; peduncles 1 in. long or more, solitary, leaf-opposed, bracteate, bracts few, foliaceous. Fruit yellowish.

Hooker describes three varieties under this head—*M. citrifolia, M. bracteata* and *M. elliptica.*

Cultivated and wild in many parts of India. Attains a height of 12-15 ft. and a girth of 1-2 ft. Fl. April-May.

The wood is of a yellowish-brown or yellow colour, and is used for gunstocks. The root of this and other species of the genus yields a valuable red dye which is fixed with alum, and for the sake of which the plant is cultivated in Berár, Khándesh, Surat and various other places.

M. tomentosa, Heyne; Dalz. & Gibs. Bby. Fl. 114. *Aal.*

A tall shrub or small tree; branchlets 4-angled, tomentose. Leaves 4-7 in. long, broadly-ovate, or ovate-oblong, acuminate, tapering into a short, thick, tomentose petiole, entire, membranous, pubescent on both sides, stipules bi-fid. Flowers white, sessile, on a globular head; peduncle ½-1 in., leaf-opposed, tomentose, solitary, axillary, larger than the petiole, or sometimes several together at the end of the branchlet. Calyx truncate; corolla campanulate, tomentose. Fruit, globose or ovoid, about 1 in. diam.

Common in the Konkan, some parts of the Deccan, and throughout India. Attains a height of 15-20 ft. and a girth of 1-2 ft.

This species is described by Hooker as a variety of *M. tinctoria.*

The wood is like that of the preceding, and is used for the same purpose.

SAPOTACEÆ.

Chrysophyllum Roxburghii, G. Don.; Dalz. & Gibs. Bby. Fl. 139. *Tarsi* or *tarsiphala.*

A very large tree; young shoots and leaves rusty-pubescent. Leaves 3-7 by 1-2 in., elliptic or ovate-lanceolate, produced into a longer or shorter obtuse point, glabrous, entire, short-petioled. Flowers minute, pale-yellow, 5-merous, pedicels axillary, fascicled, recurved, about 4 lin. long. Calyx segment unequal, imbricate. Corolla tube as long as the calyx, lobes obtuse. Fruit spherical or obscurely 5-angled, 1-1½ in. diam., when ripe deeply 5-angled, smooth, and yellow. Seeds brown, imbedded in glutinous pulp. — Timber Trees.

Found in Chorla Ghát and in Sunda jungles in this Presidency, and is common also in Madras, Bengal, Ceylon and Pegu

Alt. 3000 ft.

It is an evergreen 60-70 ft. high with a girth of 4-7 ft. Fl. during the rains; Fr. December-March. Fruit eaten, but not palatable.

The wood is used for building purposes.

Sideroxylon tomentosum, Roxb. Fl. Ind. i. 602.—*Sapota tomentosa*, Dalz. & Gibs. Bby. Fl. 139. *Kanta, kumla, kumba.*

An evergreen, middle-sized tree, frequently armed with blunt axillary spines. Young parts tawny-tomentose. Leaves 3-5 by 2 in., oval, oblong, or obovate-oblong, short-petioled, glabrous above, more or less tawny-villous and often glabrescent beneath, a little waved. Flowers rather small, dull-white, 5-merous, fascicled, axillary, nodding. Calyx rusty-pubescent, about 3 lin. Corolla twice as long as the calyx; petaloid staminodes as long as the stamens, hairy, yellow. Fruit ovate, size of an olive, yellow, 1 or 2-seeded by abortion.

Common on the higher ghâts in this Presidency as well as in Madras. Fl. February-March; ripens fruit about the beginning of the rains. The sambur devours this fruit voraciously.

The wood is brown, fibrous, loose-grained and heavy.

Achras sapota, Linn.; Dalz. & Gibs Bby. Fl. Suppl 50; Brand. For. Fl. 288. *Chicú.*

Young shoots covered with tawny-tomentum Leaves 2-3 in., lanceolate-acuminate, obtuse or almost retuse, entire, glabrous, approximated near the ends of the branches; petiole ½-1 in. Flowers 6-merous, whitish, scentless, on solitary axillary pedicels, ½-1 in. Calyx tawny-tomentose, 2-4 lin. long. Corolla slightly longer than the calyx. Berry globose or oblong, when ripe covered with a brown, scabrous rind. Seeds 10-12, covered with yellowish tawny sweet pulp.

A native of South America; cultivated in gardens in Bombay, the Deccan, and various parts of India

Attains 40-60 ft. in height and 3-4 ft. in girth. Fl. in the cold season; ripens fruit in the rains.

Wood hard, reddish-brown, heavy, and very durable. The pulp of the fruit is eaten.

Bassia latifolia, Roxb.; Dalz. & Gibs. Bby. Fl. 139; Brand. For. Fl. 289. *Mahwa, moho.*

Young parts, petiole and pedicels pubescent or tawny-tomentose. Leaves 4-8 in. by 2-4 in., elliptic or oblong-elliptic, short-acuminate, coriaceous, congested near the ends of branches; petiole round, 1-1¼ in.; stipules subulate, downy. Flowers white, or yellowish-white,

Timber Trees.

numerous, fleshy, crowded from the extremity of the branches, drooping on pedicels 1-1½ in. Calyx 4-5-sepalled, coriaceous, densely rusty-tomentose. Corolla tube ovoid; limb 7-14-parted, stamens 20-30 in three series. Fruit fleshy, ovoid, 1-2 in., 1-4-seeded, very rarely more.

Cultivated and wild in the Konkan, Gujarát, and Rájwara, and throughout India.

Attains 40-60 ft. in height and 6-7 ft. in girth. Fl. March-April; Fr. June-July. Leafless February-April, and the new leaves appear soon after.

The wood is of a reddish-brown colour, hard, and very strong, even-grained, tough, and proper for naves of wheels and railway sleepers. The tree produces an abundance of flowers from which a strong spirit, called *Maurah*, is distilled in large quantities for exportation in Uran, Surat and Poona. Being sweetish to the taste these flowers are voraciously consumed by the poorer classes to whom they are a nourishing food. During the famine of 1873 and 1874 in Behár they kept thousands of people from starvation. A single tree is said to yield from 200 to 400 lbs. of flowers. From the seeds a greenish-yellow oil is expressed; the oil-cake is stated to be used to poison fish, and the smoke produced from burning it to kill insects and rats. The residuum left after the expression of the oil is used as an emetic. (*See* Section Fruits, Vegetables and Plants used during seasons of scarcity.)

B. longifolia, Linn.; Dalz. & Gibs. Bby. Fl. 139; Brand. For. Fl. 290. *Mahwa, mohi.*

Young shoots villous. Leaves 4-7 in. by 1-1½ clustered near the ends of the branches, lanceolate, narrow at both ends, entire, smooth on villous petioles 1-2 in.; stipules villous, caducous, ensiform. Flowers crowded near the ends of branches, larger and more fleshy than in the last species. Pedicels 2-3 in., sub-erect, one-flowered. Calyx segments 4, acute. Corolla tube, length of calyx; limb 8-10-cleft. Anthers 16-20 in two series. Berry oblong, size of a plum, yellowish when ripe.

In Southern Konkan and north of Goa, confined to the southern limits in the latitude of Dhárwár, Kánara; also in Madras, Bengal, Mysore and Ceylon; not found at great elevations. Also cultivated.

Attains a height of 40-50 ft. and a girth of 4-6 ft. Fl. April-May; Fr. August-September.

The timber is of a yellowish-brown colour, heavy, close-grained and durable, scarcely inferior to teak in strength. Used for the construction of carts, for keels of ships, and in building. The flowers are eaten raw, cooked, or roasted The seeds contain about 30 per cent. of a yellow oil. It is extracted by expression, and is used in lamps, in the manufacture of country soap, and that of candles in England. It is also a substitute for ghee among the poorer classes. It concretes at ordinary temperature, and becomes rancid within a month, unless kept well-corked. Externally it is used in the cure of itch. Leaves and bark in decoction and the milky juice of the green fruits are employed in rheumatism.

B. elliptica, Dalz. & Gibs. Bby. Fl. 139. *Panchoti,* [illegible]

A very large tree with rusty bark. Leaves 2½-4 in. by [illegible] crowded at the end of branchlets, coriaceous, entire, [illegible] minate, narrowed at the base, dark-green above, [illegible] petiole ½-1 in., nerves prominent beneath; peduncles [illegible]

3-4 times longer than the petioles, erect. Calyx 6-divided, divisions in two series. Corolla 5-6-cleft, contorted in aestivation, deciduous. Stamens 12-18. Fruit oblong, smooth, size of a large almond, 1-seeded by abortion. **Timber Trees.**

Common in the Bombay Gháts, Travancore, Wynaad and Madras. Alt. 4000 ft.

Attains a height of 100 ft. and a girth of 12 ft. Fl. in February.

The wood is hard, takes a good polish, and is used in Malabár for building purposes. The tree yields a kind of gum which is known as the *Indian gutta-percha*, but is of no value compared to the true article. It might, however, be used as bird-lime and for encasing telegraph wires.

B. Wightiana, Bed. For. Man. Bot. 141.—*Isonandra Candolliana*, Dalz. & Gibs. Bby. Fl. 139.

A small glabrous tree; young parts occasionally densely tomentose. Leaves variable in shape and size, 1½-14 in., orbicular or obovate-oblong, lanceolate, bluntly-acuminate, or obtuse at the apex, tapering at the base; glabrous on both sides, or sometimes tomentose beneath, nerves prominent beneath; petiole 2-6 lin. long. Flowers white or greenish-white, small, 3-4 lin. long, axillary, fascicled, 2-12 together, sessile or sub-sessile. Calyx 4-lobed. Corolla deeply 4-cleft. Fruit oblong, ½ in., red when ripe. Seed 1-2 by abortion, brown, shining.

Along the Western Gháts as far as Ceylon.
Alt. from 2-6000 ft.
Fl. March-April.
The uses of the wood are unknown.

Mimusops Indica, Brand. For. Fl. 291.—*M. hexandra*, Dalz. & Gibs. Bby. Fl. 140. *Kirni, rayani.*

A glabrous tree. Leaves 2-4 by 1½-2 in., obovate-oblong, notched at the end, narrowed at the base, sometimes crowded at the end of the branches, glabrous, shining above. Petiole ½-1 in. Flowers white and yellow, not fragrant, ¾ in. diam., on ½-¾ in. solitary, axillary pedicels. Calyx segments 6. Corolla lobes two series, the outer consisting of 12 white and the inner of 6 yellow lobes. Stamens 12. Fruit about 1 in. in diam., yellow when ripe, smooth, usually 1-seeded by abortion. Seed compressed, oblong, about ½ in.

Common on our gháts, Konkan, Gujarát, Daman, Ahmedabad, Panch Mahâls, Ahmednagar; also at Multán, Lahore, Ceylon, and cultivated in villages along with *M. elengi*.

This ornamental, evergreen tree attains a height of 50-60 ft. and a girth of 12-15 ft. Fl. November-December.

The wood is reddish-brown, very strong, close-grained and durable. It is used for making sugar and oil mills, cart-wheels, etc. The fruit is said to be the chief article of food of the poorer classes in Gujarát during the hot-weather months.

M. elengi, Linn.; Dalz. & Gibs. Bby. Fl. 293. *Wowli, bakul, mulsari.*

A glabrous tree; young shoots and pedicels shortly rusty-pubescent. Leaves 3-4 by 1-1½ in., entire, smooth, coriaceous, shining, glabrous, elliptic-oblong, acuminate, on a petiole ½-¾ in. Flowers white, very

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fragrant, about 1 in. diam., in axillary fascicles of 2-8 drooping on tawny pedicels 4-6 lin. Calyx segments 8. Corolla lobes three times as many as sepals; the outer series consists of 16 (occasionally 12), the inner of 8 (occasionally 6) lobes. Stamens 8. Berry about ½-1 in., yellow when ripe, smooth, edible, 1-seeded by abortion.

Cultivated in our gardens. Common allover the Presidency and in Madras. Cultivated also in various parts, as in Delhi, Lahore, Multán, on account of its much-esteemed fragrant flowers.

This evergreen, ornamental tree attains a height of 40-50 ft. and a girth of 4-7 ft. Fl. March-April, and Fr. about the end of the rains.

The timber is reddish-brown, close-grained, strong and durable, lasting fifty years. It takes a good polish, and is used for furniture and building purposes. The bark possesses tonic properties, and is employed in Java as a tonic in fevers. Its decoction forms a good gargle in salivation. Water distilled from the flowers is employed in Kánara as a stimulant and a perfume. The tree is also said to yield a good gum. Oil is expressed from the seeds.

M. Kauki, Linn.; Dalz. & Gibs. Bby. Fl. Suppl. 50; Brand. For. Fl. 293. *Pomo* or *fructa de Adão* at Goa.

A glabrous tree; branches numerous, round, spreading horizontally. Leaves 2½-4 in., clustered at the ends of the branches, elliptic-ovate or obovate, obtuse or retuse, entire, coriaceous, dark-green, shining above, white or ash-white beneath, nerves parallel, prominent beneath; petiole ¼-1 in. Flowers white with a purple tinge, about ¼-½ in. diam., on solitary, axillary, recurved pedicels about as long as the petiole. Calyx divisions 6 in two series, slightly downy. Corolla lobes in two series—12 outer, 6 inner. Berry oval or obovate, purple when ripe, crowned with persistent style, 1-seeded by abortion, 1-1½ in. long. Seed triangular, compressed, of a light purplish colour.

Is a native of the Eastern Archipelago and Australia, and cultivated at Goa, Malabár, Cochin and Calcutta on account of the fruit, which contains a sweet, somewhat acid, pulp which is edible. Very rare in Bombay.

Is a beautiful, evergreen tree 30-40 ft. high, with a girth of 3-6 ft. Fl. in the hot season, and Fr. August-September, the fruit remaining on the tree a long time. The inner bark is red, and the wood light-brown From incisions in the bark a viscid juice exudes, which may probably be converted into an inferior sort of *gutta-percha.*

EBENACEÆ.

Diospyros melanoxylon, Roxb. Cor. Pl. t. 46; Brand. For. Fl. 294.—*D. exsculpta,* Dalz. & Gibs. Bby. Fl. 142. *Timburni, tumri kendu, kenduka* (Sans.)

All the young parts and inflorescence covered with grey or tawny tomentum. Leaves alternate or sub-opposite, 3-6 in. by 1½-2 in., sometimes longer, coriaceous, oval, or elliptic, narrowed at both ends, when full grown glabrous above, tomentose or pubescent beneath. Petiole ¼-½ in. Flowers white; male peduncles very short, 3-12-flowered, axillary or extra-axillary; bracts, calyx and corolla densely tomentose. Stamens 12-16, inserted on the torus; female solitary axillary or extra-axillary, usually twice larger than the male, on short pedicels. Calyx-lobes 4-5. Corolla-lobes 4-5. Staminodes

8-10 or less. Styles 2 or 3, bi-fid; ovary round, hairy, 4-8-celled, with one ovule in each cell. Fruit globose, yellowish when ripe, 1-1½ in. across, 4-8 seeded. **Timber Trees**

Is not uncommon in Bombay, North Kánara and the Madras forests, extending northwards as far as the Rávi.

Attains a height of 30-50 ft. and a girth of 6 ft. Sheds foliage in the cold season; renews and puts forth flowers in the beginning of the hot weather; Fr. during the rains.

This is a valuable timber tree, the wood being whitish or with a yellowish or brown tinge outside, and the core jet-black. It is heavy, close and even-grained, and takes a fine polish. The pulp is yellow, sweet, soft and highly astringent, and is much appreciated during the hot months. Douglas mentions a variety without stone which is cultivated in the Central Asian highlands.

D. montana, Roxb. Cor. Pl. t. 48.—*D. cordifolia,* Roxb. Cor. Pl. t. 50; Brand. For. Fl. 296.—*D. goindu,* Dalz. & Gibs. Bby. Fl. 141. *Goindu, temru, lohari, bistend.*

A pubescent or tomentose tree, sometimes glabrate, armed with spinescent branchlets. Leaves variable in size and shape; 1-6 in. long, always alternate, ovate-oblong, linear-oblong, elliptic or obovate-oblong, obtuse or more or less acute or acuminate at the apex, rounded or cordate at the base, on a slender petiole about ½ in. Flowers greenish-white, fragrant (?), small, 4-merous; male flowers 2-6, sometimes more, in short, pedunculate, recurved axillary cymes; stamens 16; female flowers solitary, axillary, larger than the male on recurved pedicels 3-5 lin. long. Staminodes 4-12. Ovary 8-celled with one ovule in each cell. Fruit globular, ½-1½ in. diam., 2-8-seeded, yellowish when ripe, smooth.

Common on our ghâts and throughout India.

Height 20-30 ft., sometimes more in higher situations; girth 3-5 ft. Fl. March-May; Fr. in the cold season.

The wood is dark-brown mottled with white, hard, close-grained, takes a fine polish, and is used for furniture. Fruit bitter, not eaten. Leaves used as fodder in Oude.

D. chloroxylon, Roxb. Cor. Pl. t. 49; Brand. For. Fl. 297; Dalz. & Gibs. Bby. Fl. 140. *Ninai.*

A small tree occasionally armed. Leaves 1-2 in. by ¾-1¼ in., alternate, elliptic-oblong, or obovate-oblong, pubescent above, rusty-tomentose beneath on petioles 3-4 lin. Flowers white, tetramerous; male in axillary fascicles of 6-10 minute flowers; stamens 16 in 2 series, the inner smaller; female flowers solitary, sessile, small, with about 8 stamens; styles 4, bi-fid. Ovary 8-celled. Fruit globose, size of a cherrry, purplish when ripe, 2-3-seeded by abortion.

Common about Surat and in the Násik Districts, Orissa and Circars.

Wood hard, yellowish and durable; useful for various purposes. The ripe fruit is eaten, and is very palatable.

D. embryopteris, Persoon.; Brand. For. Fl. 298.—*Embryopteris glutinifera,* Roxb. Cor. Pl. t. 70. *Gab, timburi, makur-kendi* (Bomb.)

A glabrous tree. Leaf bud silky with adpressed hairs. Leaves 5-8 in. by 2 in., alternate, short-petioled, coriaceous, smooth, shining,

Timber Trees.

linear-oblong on thick wrinkled petioles less than ½ in. long. Flowers white, fragrant, tetramerous, male peduncles axillary, length of petiole, drooping, 3-6-flowered, furnished with a small deciduous bract; anthers 40 on 20 filaments; female axillary, solitary, larger than the male, on short recurved pedicel. Staminodes 1-4. Ovary globular, hairy, 8-12-celled. Styles 4-6. Stigma branched, usually 2-3-fid. Fruit 1½-2 in. diam., globular, rusty-yellow when ripe, covered with a rusty, meal-like tomentum. Seeds usually 5-8, immersed in viscid glutinous pulp, reniform.

Common in Sálsette, the Konkan and the forests of Southern India, Ceylon, Burma and Banda.

Alt. 2500 ft.

This evergreen tree is usually 30-35 ft. high (more in higher parts), with a girth of 4 ft. Fl. March-May; Fr. in the cold season.

Wood pinkish grey or light-brown mottled with dark streaks. It is of indifferent quality, and is sometimes used for building purposes, and in Ceylon for masts and yards. The fruit has a strongly astringent taste, due to the presence of tannin, and an infusion of it is used for steeping in fishing nets and lines to strengthen and preserve them. The pulp serves also to pave the seams of boats, and Mr. Rheede states that book-binders in Malabár use it instead of gum both on account of its adhesiveness and from its being obnoxious to worms. It is stated in the Indian Pharmacopœia that an extract of this fruit is a good astringent. The expressed oil from the seeds is employed in native medicine.

D. Candolleana, Wight. Icon. Pl. 1221; Dalz. & Gibs. Bby. Fl. 142.

A large glabrous shrub or small tree. Leaves 4-6 by 1-2 in., elliptic-oblong, obtusely acuminate, very coriaceous, veinless, rather shining. Flowers axillary, aggregate, sessile; calyx and corolla 4-5-cleft; calyx densely rusty-pubescent; male flowers very numerous, stamens 10, filaments united by pairs at the base; anthers apiculate; female calyx segments revolute at the margins. Staminodes 4-5, single; ovary 4-celled, style simple; stigma 2-lobed. Fruit ovoid, hard, size of a nutmeg.

On the Bombay Gháts, the northern slopes of the Nilghiries, and Wynaad.

Fl. in the hot season, and Fr. during the rains.

D. paniculata, Dalz. & Gibs. Bby. Fl. 141.

A glabrous, middle-sized tree. Leaves 5-9 by 1½-2¾ in., lanceolate-oblong, obtusely acuminate, very coriaceous, veins closely reticulated on a petiole ¼-½ in. Male flowers numerous on velvety axillary cymes about ⅓ the length of the leaves; bracts large, ovate, obtuse, deciduous. Calyx 5-divided, ventricose; segments foliaceous, broadly oval, obtuse; corolla velvety outside, twice as large as the calyx; segments oblong, obtuse, as long as the tube. Stamens 20 in pairs sub-equal; female flowers solitary, extra-axillary; peduncles 2-3 times the length of the petiole, with 2 large ovate bracts about the middle. Calyx accrescent with the fruit, glabrescent. Fruit ovoid, densely tomentose, 3-4-celled, supported by the enlarged calyx.

Chorla Ghát and Raighad.

Alt. 2-3000 ft.

Fl. in the cold season.

D. pruriens, Dalz. & Gibs. Bby. Fl. 141. Timber Trees

A small or middling-sized tree, branchlets softly hairy, hairs yellow. Leaves 3-5½ by 1-2½ in., narrow, oblong, obtusely acuminate, more or less cordate at the base, glabrous above, except the costa, hirsute beneath on a petiole 1-2 lin. long. Fowers, male usually solitary, sometimes twin on axillary or extra-axillary peduncles 2-3 times the length of the petiole. Calyx 4-parted; segments oblong, obtuse, reticulated, glabrous within, very hairy on the outside. Corolla hirsute on the outside, limb 4-divided, stamens about 14, connate at the base, unequal in length arising from the torus surrounding a hairy rudiment of an ovary. Female inflorescence as in the male; staminodes 4; styles 2. Ovary 4-celled, hairy. Fruit ovoid, conical, 1¼ in. long, clothed with fibrous stinging hairs.

Common on the Bombay Gháts, Kánara, Tinnevelly and Wynaad; found also in Ceylon.
Alt. 3000 ft.

D. nigricans, Wall.; Dalz. & Gibs. Bby. Fl. 141.

A small glabrous tree turning very black in drying. Leaves 4-5 by 1¼-2 in. oblong or lanceolate, suddenly acuminated, slightly attenuated at the base, glabrous on petiole ¼-½ in. long. Male flowers in small 3-flowered axillary cymes Calyx villous, terminate, 4-parted to the middle, lobes ovate or sub-acute, ciliated. Corolla 4-cleft, glabrous; lobes rounded or emarginate; stamens about 26, unequal in length, in twos, threes or fours, inserted in the base of the corolla, surrounding a rudiment of a 10-lobed ovary; female solitary, increasing in fruit with the lobes much reflexed. Fruit glabrous, globose, depressed, 8-celled.
Chorla Ghát.

Maba buxifolia, Pers.; Roxb.—*M. nigrescens*, Dalz & Gibs. Bby. Fl. 142. *Rakt ura* (name given to some other plants also).

A small tree, young parts more or less rusty or tawny-pubescent. Leaves ½-5 in., oval, ovate, obovate or orbicular to linear-lanceolate, coriaceous or membranaceous, glabrous and shining above, or sometimes clothed with tawny adpressed hairs; becomes black in drying. Flowers small, yellow, shortly pedicelled, 3-merous; male usually 3, smaller than female; stamens 6; ovary rudimentary; female solitary, axillary, almost sessile. Calyx minutely pubescent outside. Ovary 3-celled. Style very short. Stigma 3-toothed. Fruit 3-5 lin. diam., round, smooth, yellow when ripe, 1-3-seeded.

Not uncommon in the Bombay forests, Madras and Ceylon. Is a tree in sheltered situations, and a shrub in the plains.
Alt 6000 ft.
Fl. in the hot season.
The wood is black-coloured, hard and durable, and is used for various purposes where durability is principally required. The berries are said to be palatable, and are eaten by the poor people.

Holochilus micranthus, Dalz. & Gibs. Bby. Fl. 142.

A middling-sized tree. Leaves 4-5 by 2, elliptic, oblong, obtusely acuminate, narrowed at the base, glabrous, coriaceous, petiole about ¼ in. Flowers minute, white, diœceous, male unknown; female about

Timber Trees.

3 in. long, axillary, solitary, sessile. Calyx tube entire, truncate, sitting on a few bifarious imbricated scales, accrescent in fruit. Corolla tubular, 3-cleft almost to the middle, 3 times the length of the calyx, lobes ovate, obtuse, spreading; staminodes 6, inserted at the base of the corolla, filaments free. Ovary hemispherical, smooth, glabrous, 6-celled; ovules solitary in the cells, pendulous. Styles 3, thickish, Stigma obtuse. Fruit cylindric, oblong, supported at the base by the enlarged calyx, dry, hard, 6-celled.

The female plant only was discovered by Dalzell on the Konkan Ghát. It Fl. February-March.

This is believed to be probably a species of *Maba*.

STYRACEÆ.

Symplocos spicata, Roxb.; Brand. For. Fl. 300.—*Hopea spicata*, Dalz. & Gibs. Bby. Fl. 140. *Lodh* (Kumaon).

A glabrous tree. Leaves 3-6 by 1-1½, elliptic-oblong, obovate or lanceolate, obtuse or shortly acuminate, entire or irregularly toothed, tapering into a petiole 4-6 lin., coriaceous, shining, and in a dry state yellow. Flowers numerous, small, almost sessile, yellowish, white, forming more or less branched axillary spikes 2-3½ in; bracts and bracteoles round, ciliate, deciduous. Calyx 5-parted; lobes exceedingly short, broad; petals about 1½ lin. long, cohering in a ring with the stamens, which are about 40, long exserted. Ovary 3-celled, with 3-4 ovules in each cell. Stigma large. Drupe size of a pea, turbinate, olive-coloured, 12-ribbed, containing a one-seeded nut.

Common on the ghâts and in the Nilghirics; also in Burma and Assam. Alt. 7000 ft.

Is an evergreen, middling-sized tree. Fl. August-December.

Wood close-grained, light, not durable; used for fuel. The fluted seeds are strung and worn round the neck as a charm against evil spirits.

S. racemosa, Roxb.; Brand. For. Fl. 301.—*Hopea racemosa*, Dalz. & Gibs. Bby. Fl. 140. *Lodhra, lodh, kaulá (?)*.

A glabrous tree; young shoots and inflorescence more or less pubescent. Leaves 3-6 by 1½-2 in., coriaceous, shining above, elliptic, oblong or lanceolate, obtusely acuminate, more or less serrulate, turning yellowish in drying, on a short petiole. Flowers small, yellowish, fragrant, sub-sessile, on short, axillary, simple or branched villous racemes; bracts and bracteoles pubescent. Calyx-lobes 5 ciliate, about 1 lin.; petals nearly 3 lin. long. Stamens numerous, unequal, as long as the petals, and inserted at their base. Ovary 3-celled. Fruit narrow, oblong, more or less distinctly ribbed, purple when ripe, ½ in. long, enclosing a hard, 1-3-celled nut, with 1 or 2 seeds by abortion.

Common in our forests, Bengal, Kassia, Sikkim, Nepaul. Alt. 5000 ft.

This evergreen tree attains a height of 20-25 ft., with a girth of 1-1¼ ft. Fl. October-January; Fr. April-May.

The wood is yellowish, strong and compact, and is used for furniture. From the bark a red dye is obtained, which is useful for dyeing.

OLEINEÆ.

Timber Trees.

Nyctanthes aroor-tristis, Linn.; Dalz. & Gibs. Bby. Fl. Suppl. 51; Brand. For Fl. 314. *Parbati*, a corruption of *prajatak, harsinghar, shali, nibari, khurasli.*

A large shrub or small tree rough all over with stiff hairs, branches 4-cornered. Leaves 3-4 in., ovate, oblong-ovate, acuminate, entire, on a petiole 1-3 lin. Flowers white with a deep orange tube, fragrant, sessile; open in the evening and fall early in the morning, each supported by 2 bracts. Capsule obovate, truncate or notched, about 1½ in. long, glabrous.

Indigenous in various parts of India; on this side only cultivated.

Attains a height of 15-20 ft. and a girth of 3 ft. Fl. chiefly during the rains, and more or less throughout the year. Lafless in February; foliage renewed April-May.

The timber is brown, close-grained, and only used as fuel. The rough leaves are used to polish wood, and from the orange tube of the flowers a fine buff orange-coloured dye is prepared.

Schrebera Swietenioides, Roxb.; Dalz. & Gibs. Bby. Fl. 138; Brand. For. Fl. 305. *Moka, gantha.*

A glabrous tree. Leaves about a foot long, opposite or sub-opposite in pari-pinnate leaflets 3-4 pair with the old one, 3-4 in., ovate-lanceolate, obtusely acuminate, unequal-sided at the base, opposite, or sub-opposite, shining. Flowers yellowish-white, turning brown, fragrant at night, arranged in terminal, trichotomous, corymbose panicles 3-6 in. long. Calyx glabrous or rarely pubescent. Corolla ½ in. long. Capsule 1½-2 in., woody, pyriform, rough, with white specks, bivalved.

Common below the Thull Ghát; found rarely in South and Central India, Madras, Burma.

Attains a height of 40-60 ft. and 4-5 ft. girth. Fl. February-April; Fr. in the cold season. Leafless January-March; new leaves appear April-May.

Wood yellowish-grey or white, close-grained, hard and durable; useful for turning, making combs, etc.

Olea Roxburghiana, Rœm. & Schult; Dalz. & Gibs. Bby. Fl. 159.

A small or middling-sized, glabrous tree. Leaves 4-5 by 2 in., oblong or ovate-elliptic, acuminate, attenuated at the base, entire, waved at the margin on a petiole 1-1½ in. Flowers white, panicles axillary arising from beneath the leaves, many-flowered, bracts small. Corolla-tube short, lobes deep. Stigma 2-cleft. Fruit small, oblong, purple.

Common in the forests of this Presidency, Madras and elsewhere. Alt. 6000 ft.

Fl. in the hot and at times in the rainy season; Fr. November-February.

Wood pale-brown, hard, close-grained, durable, used for agricultural implements and turning.

O. dioica, Roxb.; Dalz. & Gibs. Bby. Fl. 159. *Parjamb, karambu.*

A glabrous, diœceous tree. Leaves 3-5 by 2-2½ in., oblong-elliptic, lanceolate-acuminate, remotely and rather acutely serrate, coriaceous,

Timber Trees.

narrowed at the base; petiole 3-4 lin. long. Flowers small, greenish-white (female somewhat larger) arranged in short panicled racemes arising from the axils of the leaves opposite to them or below; no rudiment of an ovary in the male flower. Drupe size of a pea, purplish, globose, with a one-seeded nut.

Common at Mátherán, Lonávli, Mahábaleshvar and other gháts; also at Khandála, Wag Dongar near Vengúrla, South Kánara, forests of Chittagong.

Fl. February-March; Fr. May-June.

The wood is white, strong and close-grained, and is used for various purposes.

Ligustrum Neilgherrense, Wight.; Dalz. & Gibs. Bby. Fl. 159.

A large shrub or small tree, glabrous. Leaves 1½-2 by 1-1½ in., ovate-elliptic, acute or acuminate, coriaceous, entire, short-petioled. Flowers numerous, white, fragrant, on thyrses at the end of branches. Fruit black, size of a pea.

This species resembles *L. Perrottetii* of the authors, and is very common at Mahábaleshvar, Rám Ghát, Khandála and other gháts.

Fl. in the cold season; Fr. May-June.

Wood light-brown, rather close-grained and durable. Generally used at Mahábaleshvar in the construction of huts and for fuel.

Chionanthus Malabarica, Bedd.—*Linociera Malabarica*, Wall.; Dalz. & Gibs. Bby. Fl. 159.

A small tree; young parts covered with adpressed hairs. Leaves 3-6 by 1-2¼ in., elliptic or obovate-obtuse, acute or acuminated, cuneately attenuated at the base, glabrous on both sides, short-petioled. Flowers white, fragrant, 1-3 sessile on the top of a peduncle ½ in., or several on cymose panicles about 2 in.; bracts of the ramifications small, deciduous. Calyx usually densely hairy, sometimes glabrous. Petals linear in duplicate-valvate channel united in pairs by the stamens. Fruit ovate or obovate, oblong-angled, about ½ in. long.

Very common on our gháts at Khandála, Rám Ghát, etc.; also in Madras and Ceylon.

Fl. November-December.

SALVADORACEÆ.

Salvadora Persica, Linn.; Dalz & Gibs. Bby. Fl. 312; Brand. For. Fl. 315. *Pilu, kharjal, kabbar, arák* (Arab); *tooth-brush tree.*

A large shrub or middling-sized tree, scabrous, branchlets pendulous. Leaves 1-2 by 1 in., oval or ovate to narrow-lanceolate, entire, coriaceous, very smooth and shining and glaucous on both sides; petiole ⅜-1 in. Flowers greenish-white on slender pedicels usually about ⅛ in. or shorter, arranged in axillary and terminal lax panicles longer than the leaves. Calyx-lobes 4-parted, ciliated. Corolla cleft almost to the base into 4 generally reflexed lobes. Berry globose, smooth, fleshy, red when ripe, 2-2½ lin., embraced at the base by the persistent calyx.

Common near the sea in Gujarát, Konkan, Madras, and in the Circars and northern parts of Ceylon. Planted in many places. Found also in Sind and elsewhere, as in Egypt, Syria, etc.

This evergreen tree attains in some places 30-40 ft. in height and 4-5 ft. in girth, sometimes 6-8 ft. Fl. November-May and more or less all the year round; Fr. in the rainy, and in some places in the cold season. Old leaves shed in April, the new ones re-appearing almost simultaneously. Timber Trees

Wood whitish-yellow, soft, easy to work, and takes a fine polish, but is little used, as it is small. White ants do not attack it. The root bark is very acrid, and is sometimes used by the natives as a vesicant. The berries have a strong aromatic odour and pungent taste like that of garden-cress, and are used medicinally. The leaves are also pungent, and are used in some places as salad. The twigs serve in lieu of tooth-brushes.

This tree has been identified by some botanists as the mustard tree of the Scripture.

APOCYNEÆ.

Thevetia neriifolia, Juss.—*Cerbera thevetia*, Dalz. & Gibs. Bby. Fl. Suppl. 53. *Zard, kunel.*

A small glabrous tree. Leaves 2-3 in., linear-acuminate like those of oleander. Flowers large, yellow, on ½-1 in. pedicels in axillary or terminal corymbs. Drupe size of a crab-apple, fleshy, smooth.

Is a native of South America and West Indies, and naturalized in Bombay, Poona and elsewhere.

Fl. and Fr. throughout the year.

Cerbera odollam, Gærtn.; Dalz. & Gibs. Bby. Fl. Suppl. 53; Brand. For. Fl. 322.

A large, glabrous tree. Leaves 4-6 in., sometimes 12 in., oblong-lanceolate or obovate-lanceolate, acuminate, tapering into a slender 1-1½ in. petiole entire and shining. Flowers white, sometimes with a yellowish throat, sweet-scented, in a corymbose terminal pedunculate cyme. Calyx-lobes reflexed, about ½ in., deciduous along with the bract; bracts coloured, large, very deciduous. Corolla-tube ¾ in. long, sometimes longer, nearly as long or longer than the lobes. Drupe ovoid, brown, or blackish when ripe. Size of an apple.

Common on salt ground along the whole of the coast line, in the Konkan; also in China, Eastern Archipelago and elsewhere.

Attains 40-50 ft in height and 3-4 ft. in girth. Is evergreen. Fl. and Fr. all the year round.

Wood white, soft and spongy. The seeds yield an oil which is used in lamps. The drupe is said to be poisonous.

Plumeria acutifolia, Poir.; Dalz. & Gibs. Bby. Fl. Suppl. 52; Brand. For. Fl. 323. *Khair-champa, gutáchin, chameli.*

A glabrous tree with thick, blunt, crooked branches. Leaves 5-15, obovate-lanceolate, shortly acuminate, entire, tapering on a 1-2-in. petiole. Flowers large, white, slightly pinkish outside, with pale-yellow throat, forming a large pedunculate cymose corymb. Follicles linear, rigid, cylindrical, divancate, about 6 in. long.

Is cultivated throughout India, China, Cochin-China, etc., but its home is not known.

Attains a height of 15-25 ft. and a girth of 2-4 ft. Fl. in the hot and rainy seasons; has never been in fruit on this side.

Attempts have been made, though unsuccessfully, to manufacture caoutchouc from the abundant, tenacious, milky juice which flows on wounding the bark or any other part of the tree.

Timber Trees.

Wrightia tomentosa, Rœm. & Schul.; Dalz. & Gibs. Bby. Fl. 145; Brand. For Fl. 323. *Kadu-inderjao, dhudi, daira.*

A small tree; branchlets and leaves softly pubescent and tomentose. Leaves 3-4 in. by 1½-2 in., elliptic-acuminate, attenuated into a petiole 1-3 lin. entire, membranous. Flowers 1 in. diam., yellowish, on short pubescent pedicels forming a short, peduncled, terminal, corymbose cyme; bracts oval, deciduous. Corolla-tube twice the length of the calyx. Corona orange-coloured, and cleft into about ten scales. Follicles 8-12 in. by ½ or more across, scabrous, with numerous elevated specks with a shallow furrow on each side. Hairs white.

Common on the hills of Northern Konkan and northern gháts, Madras, Oude, Bengal, Ceylon, Burma. Attains 20-40 ft. with a circumference of 3-5 ft. Fl. April-June; Fr. November-January. Sheds foliage February-March; renews April-May.

The wood is of a yellowish-white colour, even-grained, easy to work, and used in turning and making combs, etc. The bark of the stem and root is said to be useful in snake-bites and in scorpion-stings. From incisions in the bark a yellow milky juice flows, which, when mixed with water, forms a good dye.

W. tinctoria, Br.; Dalz. & Gibs. Bby. Fl. 145; Brand. For. Fl. 324. *Kala kuda, khirni.* The seeds are called *inderjao.*

A glabrous tree. Leaves 3-4 by 1-1½ in., elliptic-oblong, acuminate, rounded at the base, entire, membranous, glabrous or occasionally pubescent, or with the margins slightly erosed; petiole 2-3 lin. long. Flowers white, fragrant, ½-¾ in. diam., in lax terminal cymes; bracts lanceolate, caducous. Corolla-tube twice the length of calyx. Corona consisting of numerous white linear scales. Follicles 10-20 in. long by 5 lin. diam.

Common in the forests of this Presidency, Madras and other places; Meywár, Bánda.

Alt. 4000 ft.

Attains a height of 20-25 ft. and a girth of 3-4 ft.

Fl. in the hot season; ripens fruit next cold season. Sheds leaves February: renews foliage March-April.

The wood is beautifully white like ivory, close-grained, and valued for turning and carving. Indigo is made from the leaves and tender branches. The seeds, which are not bitter, are sold in the bázár as sweet inderjao, and confounded with those of *Hollarrhena.* (*See* Medicines.)

Alstonia scholaris, Br.; Dalz. & Gibs. Bby. Fl. 145; Brand. For. Fl. 325. *Satwin, satni, chatiun.*

Glabrous except the inflorescence. Leaves 4-8 by 1½-2½ in., in whorls of 5-7, oblong or ovate-oblong, obtuse or acute, narrowed into a short petiole, coriaceous, shining above and pale underneath, entire. Flowers greenish-white, sessile, or sub-sessile in pedunculate cymes. Peduncles 1-2 in. long; cymes 8-12, arranged in an umbel. Calyx-segments ovate. Corolla-lobes pubescent outside; the throat closed by a ring of hairs. Follicles slender, 1-1½ ft. long. Seeds about ¼ in. long, covered with hairs all round.

Common in our forests and those of Burma, Madras, Ceylon and elsewhere.

Alt. 3000 ft.

This evergreen tree attains a height of 40-60 ft. (sometimes even 90) and a girth of 4-6 ft. Fl. December-March; Fr. in June. Timber Trees.

The wood is whitish, even-grained, soft, somewhat porous, and used for furniture, school-boards, scabbards, etc. The bark is a powerful astringent tonic, and is used in chronic diarrhœa and dysentery in the form of infusion and tincture. (*See* Medicines.)

Holarrhena antidysenterica, Wall.; Dalz. & Gibs. Bby. Fl. 145; Brand. For. Fl. 326. *Daula, kudla, ankdia;* the seeds are called *kadva* (bitter) *inderjao, karri, karchi.*

A small glabrous tree. Leaves 4-8 by $2\frac{1}{2}$-$3\frac{1}{2}$ in., elliptic, oblong, short-acuminate, obtuse at the base, entire, on a petiole 2-3 lin. Flowers white, 1-$1\frac{1}{4}$ in. diam., inodorous, arranged in terminal corymbose cymes. Corolla-tube puberulous. Follicles smooth, 8-15 in. long, $\frac{1}{8}$ in. diam. Seeds pendulous with a tuft of hair at the hylum.

Very common in the Konkan, Madras, Bengal, Oude, etc.

Alt. 3500 ft.

Attains a height of 25-30 ft. and a girth of 3-4 ft.

Fl. April-June; Fr. in the cold season. Leafless in February; foliage renewed April-May.

The timber is pinkish or yellowish-white, even-grained, soft and light. It is used in making combs, spoons, toys, etc. The bark in powder or decoction is used with benefit in cases of chronic diarrhœa. The seeds (*inderjao*) are also used for the same purpose; they resemble oak-seeds, are narrow, oblong, about $\frac{1}{2}$ in. long, convex on one side. As stated above, they are often confounded with the seeds of *W. tinctoria*. The leaves serve as fodder. (*See* Medicines.)

LOGANIACEÆ.

Strychnos potatorum, Linn.; Dalz. & Gibs. Bby. Fl. 156; Brand. For. Fl. 317. The *clearing-nut tree, nirmali, nelmul, chilbinj.*

Glabrous. Leaves 2-3 by $1\frac{1}{2}$-2 in., ovate or rotundate, acute or obtuse, coriaceous, sub-sessile. Flowers yellowish-white, odorous, small, in short pedunculate cymes rising solitary or in pair from the scars of the fallen leaves. Corolla-tube campanulate; segments rotate with tufts of white hairs at the base. Berry $\frac{3}{4}$-1 in. diam., globose, black when ripe, 1-seeded. Seeds compressed, orbicular, imbedded in purplish pulp.

Pretty general throughout the gháts, Konkan, and Southern Marátha Country; also in Madras and Bengal.

This evergreen tree attains a height of 25-30 ft. and a circumference of 3-4 ft. Fl. in the hot season, and Fr. after the rains.

The wood is hard, greenish, pale-brown, close-grained and durable, and takes a fine polish. It is used for ploughshares, etc. The seeds are employed to clean muddy water; they are devoid of poisonous properties, and are given in gonorrhœa and diabetes. The pulp of the fruit is eaten.

S. nux-vomica, Linn.; Dalz. & Gibs. Bby. Fl. 155; Brand. For. Fl. 317. *Kajra, kara, jhar katchura.*

Glabrous. Leaves 3-4 by 2-$3\frac{1}{4}$ in., ovate or nearly orbicular, acute at the apex or quite rounded, coriaceous, shining above and glaucous beneath, prominently 3-5-nerved, on petioles 3-6 lin. Flowers greenish-white on terminal, pubescent, trichotomous corymbose

Timber Trees.

cymes. Corolla-tube cylindric, about 5 lin. long. Ovary with numerous ovules. Stigma peltate. Berry globular, size and colour of an orange. Seeds numerous, about ½ in. long, flat, shining, circular or reniform.

Very common throughout this Presidency, in the Konkan, Vádi country, Madras, Ceylon and other parts of India.
Alt. 4000 ft..

This evergreen attains 30-40 ft. in height with a circumference of 3-4 ft. It Fl. in April-May; Fr. in the cold season; sheds foliage for a short while in the hot season, the new leaves appearing almost simultaneously.

The wood is white or grey, hard, close-grained, durable, and of a bitter taste. It is used for cart-wheels, agricultural implements, fancy work, etc. The seeds, which are flat and grey, contain an extremely poisonous alkaloid, *strychnia*, which is also found in the bark.

BORAGINEÆ.

Cordia myxa, Linn.—*C. latifolia*, Dalz. & Gibs. Bby. Fl. 173; Brand. For. Fl. 336. *Bargund, vargund, gedūri, sepistar, pistan, bhokar, lesuri, semar, goden, gondan.*

Young shoot and leaves soft-pub... Leaves 3-6 by 2½-4 in., broad-ovate or orbicular, rounded ... slightly cordate at the base, entire, smooth above, paler beneath; petiole 1-2 in. Flowers small, white, sessile or sub-sessile in loose, terminal, axillary, pedunculate cymes. Calyx-lobes silky-pubescent inside. Corolla-tube the length of the calyx, glabrous. Drupe ¾-1 in. long, ovate or globular, pale-yellow, supported by the enlarged calyx; pulp very viscid.

Common in Bombay on the gháts, and about valleys throughout the Konkan, Madras, Punjáb, Bengal, Assam, etc.
Alt. 5000 ft.

Attains a height of 25-40 ft. and a girth of 3-5ft., sometimes more. Fl. March-May; Fr. May-July. Leafless in April; leaves renewed in May.

The wood is olive-coloured, greyish, or light-brown, close-grained, soft, light and fibrous, and employed in boat-building and for gun-stocks, agricultural implements and fuel. The ripe fruit is eaten, as also the young tender one as vegetable; it is also pickled. The adhesive viscid pulp is used as bird-lime, the juice being sometimes employed instead of the marking nut, though the colour is apt to fade. The ripe dried fruit is the *sebastan* of native Materia Medica, and is employed as a pectoral medicine. The kernel, especially that of the cultivated species, is also eaten. The bark is made into ropes and fuses, and the fibre is employed in caulking boats. In Otaheti the juice of the leaves is used in dyeing.

C. Wallichii, G. Don.; Dalz. & Gibs. Bby. Fl. 174; Brand. For. Fl. 337. *Dhaiwan.*

This is, botanically speaking, closely allied to the preceding, except that the leaves are densely wooly or grey-tomentose below and more distinctly cordate.

Between Malsaj and Ahmednagar and the Brahaminváda range of hills; also in the western forests of Madras and Mysore.
The wood is tough, and used for various purposes.

C. Rothii, Rœm. & Schul.; Dalz. & Gibs. Bby. Fl. 174; Brand. For. Fl. 338. *Gondni, gundi, liai.*

Leaves 3-4 by 1-1½ in., oblanceolate, obtuse, sub-opposite, entire, mucronate, rough, tapering to a petiole ½ in. Flowers small, white, numerous, 4-5-cleft, on terminal and axillary pedunculate cymes. Corolla-lobes 4-5 reflexed. Stamens 4-5. Drupe size of a pea, orange-yellow, longitudinally striated.

Not uncommon in this Presidency, especially in the villages about the Deccan and Gujarát; also in Madras, Mysore, Ajmir, Sind and Rájputána.

Height 30-40 ft.; girth 3-5 ft. Fl. April-June; Fr. in the ensuing cold season. Leafless December-January; foliage renewed February.

The wood is of a light-yellow or light-brown colour, tough, and valuable for making carriage poles, and for building in Sind. Agricultural implements are also made of it in Cutch. Gum issues from the wounded bark; hence the name *gondni* of the tree. The bark is much used for making astringent gargles, as also for ropes. The fruit, though insipid, is eaten.

C. Macleodii, H. & Th.; Brand. For. Fl. 337. *Dhaiwan, dhaman, dhaim, bhoti, daiuas.*

Young shoots, inflorescence and calyx wooly or tawny-tomentose. Leaves 5-7 in. and nearly as broad, alternate or sub-opposite, almost orbicular, cordate at the base, pubescent and rough above, on a petiole 2-3 in. Flowers white, small, on axillary and terminal cymes. Calyx 5-unequally toothed, sometimes 3-cleft, ribbed externally. Corolla-lobes undulate, spreading, or reflexed. Male flowers with a rudimentary ovary. Drupe ½ in., oval, crowned with the persistent base of style and supported by the calyx.

In Western Deccan, Sátára, [illegible]. Central India, Ajmir and other places.

Height 30-40 ft.; girth 3-4 ft. Fl. in the hot and Fr. in the cold season.

The wood is pale-brownish, mottled with white veins, hard, even-grained, tough and easily worked. Used in carpentry and building; fishing rods are also made from it.

Ehretia lævis, Roxb.; Dalz. & Gibs. Bby. Fl. 170; Brand. For. Fl. 340. *Tamboli, chambal, datranga, koda, darar.*

Glabrous tree. Leaves 3-5 by 2 in., ovate or elliptic, acutely acuminate or obtuse, rounded or acute at the base, coriaceous, entire; petiole ½ in. Flowers small, white, sessile, in terminal, and axillary compound cymes. Calyx segments 1 lin. long. Corolla-lobe spreading. Anthers exserted. Drupe red, afterwards black, size of a pepper kernel, rugose, with 4-seeded pyrenes.

Common at Málvan, south-east of Surat, Bhimáshankar, Konkan, Goa; also in Madras, Ceylon, Bengal, and various other parts of India.

Alt. 2500 ft.

Attains a height of 30-50 ft. and a girth of 3-4 ft. Fl. January-March, sometimes later; Fr. April-June. Sheds foliage in the cold season; renews February-March.

The wood is whitish or yellowish-brown, even-grained, tough, and used for agricultural implements and in building. The inner bark is said to be eaten mixed with flour in times of famine. The fruit is also eaten though insipid, and the leaves are used as fodder.

Timber Trees.

BIGNONIACEÆ.

Oroxylum Indicum, Bth.—*Calosanthes Indica*, Dalz. & Gibs. Bby. Fl. 161; Brand. For. Fl. 347. *Tantun* (Sálsette), *tetu, ullu, karkath, sauna, assar.*

Glabrous. Leaves 4-6 ft. long; pinnæ 3-4 pair, the lowest pair bi-pinnate; leaflets 3-8 in. long, broad-ovate, acuminate, petioled, sub-cordate, entire. Flowers large, fetid, dark-red, fleshy, on short pedicels in erect terminal racemes. Calyx about 1 in. long. Corolla 2-3 in. diam. Capsule 2-4 ft. by 3-4 in., flat. Seeds 1½ in. wide, with a large pellucid wing all round. The pod resembles a scabbard.

Common in the Konkan, Sálsette, Khándesh, etc.; also in Madras, Bengal, Central India, and Burma.

Alt 3500 ft.

Height 20-40 ft.; girth 2-5 ft. Fl. in the rainy season and Fr. in the cold season. Leafless February-March; foliage renewed April-May.

The wood is yellowish-white, coarse-grained and soft. The bark and fruit are used in tanning and dyeing. The seeds are employed in lining hats, and placed between two layers of wicker-work to make umbrellas.

Millingtonia hortensis, L.; Dalz. & Gibs. Bby. Fl. Suppl. 55; Brand. For. Fl. 347. *Indian cork-tree, nimi-chambeli, akas-nim.*

Glabrous. Leaves 1-2½ ft. long, opposite de-compound; leaflets 1-3 in., ovate-acuminate, rounded or obtuse at the base, entire, membranous, dark-green; petioles of the lower pinnæ and pinnules long, the upper pinnules sessile or sub-sessile. Flowers numerous, 3-3¼ in., long, pure, white, fragrant, in ample terminal panicles; bracts minute, ciliate. Capsule 12 by ¾ in., smooth. Seeds (which are rarely met with on this side) about an in. diam., flat, surrounded by a pellucid wing.

Said to be a native of Ajmir, Burma and the Indian Archipelago, but is planted in avenues and gardens in Bombay, Poona, etc.

This evergreen attains a height of 50-60 ft. (sometimes more), and a circumference of 6-12 ft. It flowers September-December; Fr. in March.

The wood is whitish or of a pale-yellow colour, firm, close-grained, takes a fine polish, and is adapted for furniture and ornamental work. From the bark an inferior kind of cork is made.

Tecoma undulata, G. Don.; Dalz. & Gibs. Bby. Fl. 161; Brand. For. Fl. 352. *Roira, lohari* or *lohero rakht-reora.*

Glabrous, with branches drooping like the weeping willow. Leaves 3-4 in., opposite or sub-opposite, linear-lanceolate, or obovate-oblong, entire, much undulated, clothed with minute white scales; petioles slender 1 in. Flowers large, about 2-3 in. long, bright, orange-coloured, inodorous, 5-10 in corymbose racemes. Calyx campanulate, 5-toothed. Corolla campanulate. Ovary 2-celled on a cup-shaped disc. Capsule slender, linear, compressed, 6-8 in. long.

Found in Western Khándesh, Gujarát, Punjáb, and Beluchistán, and cultivated in several places.

Alt 4600 ft.

This is an evergreen which attains 30-40 ft. in height with a girth of 5-8 ft. Fl. January-April, when the tree is a most beautiful sight; Fr. May-July. The foliage is renewed January-February.

The wood is hard, dark-greyish-brown, fine-grained, and takes a fine polish. It is used for cabinet-work and agricultural implements. The leaves afford fodder for cattle.

Dolichandrone falcata, Seem.—*Spathodea falcata,* Wall.; Dalz. & Gibs. Bby. Fl. 160; Brand. For. Fl. 350. *Mersingi, kanseri, mendal; manchingi.*

A small or middle-sized tree, glabrous or pubescent. Leaves 3-6 in., usually opposite, unequally pinnate, 2-3 pair; leaflets 2-3 pair, ½-1½ in., and nearly as much across, orbicular, obtuse or short-acuminate, short-petioled. Flower 1½ in. long, white, fragrant, in few-flowered terminal racemes. Corolla deeply-cleft into 5 unequal lobes. Capsule linear, flat, variously curved, 10-14 by 3-4 in. Seeds with oblong wings.

Found at Bombay, Nagotna, Khandála, Southern Marátha Country, Madras, Meywár and Bánswárá.

Fl. in the hot and Fr. in the cold season.

The wood is light-coloured, strong, durable, and used for agricultural implements and building.

D. crispa, Seem.—*Spathodea crispa,* Wall.; Dalz. & Gibs. Bby. Fl. 160; Brand. For. Fl. 350.

A small or middle-sized, glabrous tree; young shoots pubescent. Leaves 6-12 in., opposite-pinnate; leaflets 5-7, rarely 3, 2-4 in. long, oblong, acute, entire on petioles 1-2 in. long. Flowers large, white, long-pedicelled, fragrant, in terminal, few-flowered racemes. Calyx 1 in. long, spathaceous, opening on the upper side. Corolla 2½ in. long, lobes with curled edges. Capsules 12-15 in. by ½ in., pendulous, variously curved, hard, and brown.

In Dudhi in Ghatparbha, Southern Marátha Country, Madras and elsewhere.

Fl. May-June; Fr. December.

The wood is of a light-yellow colour, close-grained, heavy and durable, and used for building and other purposes.

Heterophragma Roxburghii, D. C.; Dalz. & Gibs. Bby. Fl. 160.—*Spathodea Roxburghiana,* Sprengel; Brand. For. Fl. 350. *Warras, pullung.*

A large tree. Leaves 1-2 ft. long, impari-pinnate, opposite, glabrous when old; leaflets 2-2½ by 1½ in., 3-5 pair, ovate, acute, serrate, short-petioled. Flowers whitish with a pink margin, fragrant in large, terminal, many-flowered, erect panicles. Calyx bilabiate. Corolla campanulate. Capsule 12 by 2 in., ½ in. thick, 4-celled.

Very common in our ghâts, Khándesh, Southern Marátha Country, Konkan, Kánara, Mátherán, Koina River and Godávari.

Fl. March-April; Fr. in May and the rainy season.

The wood is strong, and is used for planks and building purposes.

Stereospermum xylocarpum, Benth. & Hook.; Dalz. & Gibs. Bby. Fl. 159.—*Spathodea xylocarpa,* Brand. For. Fl. 349. *Karsing* or *karsingi, bhersingi.*

Leaves 1-4 ft., glabrous, bi-tri-pinnate, pinnæ 4-6 pair; leaflets 2-5 by 1-1¼ in., 3-5 pair, short-petioled, ovate or ovate-lanceolate, oblong-acuminated, entire, membranaceous, reticulately veined.

Timber Trees.

Flowers large, white, slightly yellow, fragrant, in large, terminal, corymbose cymes. Calyx campanulate, coloured, unequally 5-toothed. Corolla 2 in. long, curved, hard, woody, and very rough, with hard tubercles, inside smooth. Seeds numerous, winged.

Common in Thull and Parr Ghâts, Juar forest, Khándesh Dangs; also in Madras and Bengal.

Attains a height of 30-35 ft., sometimes more. Fl. March-April; Fr. at the end of the cold season. Leafless during the cold months; renews foliage in hot weather.

The wood is reddish-brown or light-brown in colour, close-grained, tough; stands a good polish, and is used by cabinet-workers.

S. suaveolens, D. C.; Brand. For. Fl. 351.—*Heterophragma suaveolens*, Dalz. & Gibs. Bby. Fl. 161. *Paral, paddal, kalagori.*

Leaves 12-24, opposite, impari-pinnate; leaflets 2-4 pair, 3-6 by 2½-3½ in., petioled, ovate or elliptic-ovate, acuminate, almost entire or slightly serrate, downy when young, glabrous when old; petiole enlarged at the base 4-6 lin. Flowers 1½ in. long, of a dark, dull, crimson colour, fragrant, glandular, puberulous, on slender pedicels, forming a large trichotomous viscid panicle. Calyx 4-cleft. Corolla campanulate, bi-labiate. Calyx-lobes curled. Capsule 18-24 by 3-4 in. diam., dark-grey, rough with elevated white tubercles. Seeds with membranous pellucid wings.

Common in Dandeli jungles, Mátherán, island of Karanja, Deccan, Madras, Bengal, Central India, Burma, etc.

Alt. 4000 ft.

Attains a height of 30-40 ft. (sometimes twice as much), with a circumference of 3-6 ft. Fl. March-April; Fr. November-December, the fruit remaining long on the tree. Is leafless in April, the new foliage appearing by the end of that month or the beginning of May.

The wood is of a reddish-brown colour mottled with white, durable, and much esteemed for building purposes. It makes very good charcoal. The root bark is used as a tonic in Ceylon.

S. chelonoides, D. C.; Brand. For. Fl. 352.—*Heterophragma chelonoides*, Dalz. & Gibs. Bby. Fl. 160. *Padal, padri, paral, kirsel, tuatuka.*

A glabrous tree. Leaves 12-18 in., opposite, impari-pinnate, leaflets 3-5 pair, 4-6 by 2 in., oval-elliptic, long-acuminate, entire or sometimes slightly serrate, short-petioled. Flowers ½-1 in., yellow, fragrant, on glabrous 2-4 lin. pedicels, forming on ample, lax, glabrous panicles. Calyx 5-toothed. Corolla bi-labiate, lobes curled, rugose. Capsule 12-24 by ½ in., compressed, curved. Seeds with membranous pellucid wings.

Common in the Bombay forests, Lonávli, Parr Ghát, etc., and throughout the peninsula, Ceylon and Burma.

Alt. 3000 ft.

Attains a height of 40-60 feet and a girth of 4-5 ft. Fl. May-July; Fr. August-January, the fruit remaining long on the tree. The leaves are shed February-March and renewed in April.

The wood is of a reddish-brown or orange colour, close-grained, soft, and useful for fancy work and in house-building. The bark, leaves, flowers and fruit are used in native medicine.

VERBENACEÆ.

Timber Trees.

Tectona grandis, Linn.; Dalz. & Gibs. Bby. Fl. 199; Brand. For. Fl. 354. *Saag, saguan, tegu, tekku, teak.*

Branches quadrangular; young parts roughish with stellate tomentum. Leaves 6-18 by 6-12 in., oval or elliptic-obovate, acute or short-acuminate, short-petioled, more or less rough, pubescent above, densely grey or tawny-tomentose beneath. Flowers small, numerous, white, on short pedicels, in large, erect, bracheate, cymose panicles 12-36 in. long. Corolla rotate, 5-6-lobed. Fruit globose, hard, more or less distinctly 4-lobed, nearly 1 in. diam., enclosed in the inflated bladdery calyx.

Common from the forests in the vicinity of the Tápti to the Konkan; Madras, Malabár, Bengal, Burma, Java, Sumatra, and islands of the Indian Archipelago. Is also cultivated in various parts. Does not appear to thrive above 2500 ft., though found of poor growth as high as 4,000 ft.

Height 70-100 ft. with a girth of 12-15 ft., though occasionally exceeding 20 ft. Flowers during the rains, and ripens fruit between November and January. Sheds its foliage early in the cold season and renews in May.

The wood is yellowish or yellowish-brown, hard, strong, very durable, easily worked, and takes a good polish. When young it is oily, and takes about two years to season. It is used for innumerable purposes, the foremost of which are ship and house-building, cabinet-work, etc. The tree yields a good oil, which is considered a substitute for linseed oil in the preparation of paints. It also yields a good varnish. The leaves are used instead of plates, and for wrapping parcels and thatching. A yellow dye is made from them.

Gmelina arborea, Roxb.; Dalz. & Gibs. Bby. Fl. 201; Brand. For. Fl. 364. *Sewan* or *shewan, kumar, gumbar.*

Young parts pubescent. Leaves 4-8 by 3-6 in., ovate-acuminate or acute at the apex, rounded or cordate at the base, tawny-tomentose beneath while young, entire almost coriaceous on a petiole 2-3 in. long. Flowers yellow tinged with brown, 1 in. long, on short yellowish pedicels in small cymes forming raceme-like tomentose, terminal and axillary panicle. Inflorescence, calyx and corolla densely tawny-tomentose. Corolla 5-lobed, bilabiate. Drupe 1 in., ovoid or obovate, fleshy, smooth, yellow when ripe.

Common at Bombay and in the Konkan; also in the Deccan, though not attaining any great size. Found also throughout India, Burma and Ceylon.

Alt. 3000 feet.

Height 50-60 ft. with a girth of 6-12 ft. Fl. February-May, and Fr. in May-June. Sheds leaves February-April, the new foliage appearing April-May.

The wood is pale-yellow, strong, light, and lasts well under water. It is used in cabinet-work and for general carpentry and toys. The fruit is eaten by the poor natives of Sátpura.

Premna latifolia, Roxb.; Dalz. & Gibs. Bby. Fl. 203. *Chambadi.*

Is a tall shrub growing into a small tree with rounded cordate or oval leaves, 2-3 in., entire or slightly dentate, petioled and greenish flowers in terminal and axillary corymbose panicles.

Timber Trees.

Common in Bombay, in the Konkan, Ceylon and other parts of India. Wood white, moderately close-grained; usually burnt for fuel.

Vitex alata, Roxb.; Dalz. & Gibs. Bby. Fl. 201.

Young shoots tomentose or mealy. Leaves tri-foliolate; petiole (especially in young plants) with a broad wing, or quite wingless, about 2-3 in. long. Leaflets 3-4 in. by 1½-2 in., sessile or sub-sessile, lanceolate, obtusely acuminate, entire, sub-coriaceous, shining above, pubescent or hoary and glandular, dotted beneath. Flowers pale-yellow, 1-3 lin., slender pedicels, in small, dichotomous, lax cymes arranged in long axillary and terminal panicles.

Found in the Southern Marátha Country, Warri jungles and the Konkan; also in Burma, Chittagong, Pegu, Tenasserim, etc.

Alt. 2000 ft.

Attains a height of 30-40 ft. and a girth of 8 ft. Fl. March-May, and sheds its foliage in the hot season.

The wood is yellowish or light-brown, soft, close-grained, heavy and strong. Used for making handles, etc.

V. altissima, Linn.; Dalz. & Gibs. Bby. Fl. 201. *Banalgay.*

A large tree; branchlets quadrangular, compressed and channelled. Leaves 3, rarely digitately 5-foliate; petiole sometimes winged; leaflets 3-6 by 1-2½ in., sessile, oblong-elliptic, acute or acuminate, sub-coriaceous, entire, slightly pubescent or glabrescent above, clothed with white tomentum beneath. Flowers white, tinged with blue, in panicles composed of numerous interrupted cymes or spikes. Corolla small, lower lip hairy. Drupe size of a pea, fleshy, black.

Found in the ravines near Nagotna; plentiful in Kánara and South Konkan; also in Madras, Bengal and Ceylon.

Alt. 4000 ft.

Fl. in May and during the rains.

The wood is light-brown, coarse-grained, hard and durable, and is used for cabinet-work, building, and many other purposes.

V. leucoxylon, Linn.; Dalz. & Gibs. Bby. Fl. 201. *Sheras, longarbis thiras.*

Glabrous, except the young shoots, which are minutely downy. Leaves 3-5-foliolate on a petiole 2-5 in. long; leaflets 2-5 by 1-3 in., oblong or lanceolate-acuminate, usually entire, acute at the base, sub-coriaceous, shining above, pale, glabrous or finely downy beneath, on petioles ½-1 in. Flowers white with the centre of the lower lip clothed with lilac hairs, numerous, fragrant, sessile on short pedicels in dichotomous, long, peduncled, axillary cymes. Calyx 5-toothed; corolla twice the length of the calyx. Drupe oval, size of a cherry, black, supported by the circular patelliform calyx.

Common at Khandála, in the Southern Marátha Country, Sávantvádi, and Konkan; rare in the Deccan. Found also in Eastern Bengal, Ceylon and Burma.

Alt. 3000 ft.

Grows to a height of 30-60 ft., attaining a girth of 3-12 ft. Fl. February-April, and Fr. during the rains. Sheds leaves in the hot season.

The wood is greyish-brown, hard, close-grained, and durable. It is used for cart-wheels, and has been recommended for furniture.

V. negundo, Linn.; Brand. For. Fl. 369.—*V. bicolor*, Dalz. & Gibs. Bby. Fl. 201. *Nargunda, nirgur, shiwari, nisinda.* Timber Trees.

A tall shrub or small tree; young shoots, lower surface of leaves and inflorescence clothed with white tomentum. Leaves 3-5-foliolate on a 1-in. petiole; leaflets 1-4 in, short, petiolulate, lanceolate, entire or coarsely-toothed. Flowers small, bluish-white, in terminal thyrsus. Berry size of a pea, black when ripe.

Common everywhere in the plains and the ghâts, ascending up to Mahâbaleshvar, where it is rare.

Is an evergreen tree 15-20 ft. high, with a trunk 2-3 ft. in circumference.

The timber is used for fuel; the leaves are much employed in native medicine (*see* Phar. of India), and the branches for wattle-work.

Avicennia officinalis, Linn.; Brand. For. Fl. 371. *White mangrove.*

Leaves 1½-3 in., elliptic-lanceolate, obovate-acuminate, tapering into a petiole 3-5 lin; coriaceous, entire, glabrous above, clothed with a white minute tomentum beneath. Flowers yellow, fragrant, sessile, small, in terminal heads. Calyx lobes 5. Corolla segments 4; capsule ovate, compound, acuminate, 2-valved, 1-seeded.

This small tree grows abundantly in the salt marshes in Bombay, Konkan and elsewhere.

Fl. April-May.

The bark is used for tanning, and a preparation of the ashes for washing clothing by dhobies. Painters mix them with their colours to make them adhere.

NYCTAGINEÆ.

Pisonia morindifolia, Wall.; D. C. Prod. ii. 447; Dalz. & Gibs. Bby. Fl, Suppl. 72.

A tall shrub or small glabrous tree. Leaves 6-12 by 5 in., ovate-oblong or elliptic-oblong, acute or shortly acuminate, usually oblique, and unequal at the base, membranous, glabrous, entire, or denticulate, pale-green, petiole ½-1½ in., veins prominent below. Flowers yellowish-green in terminal, rather large cymes; appear in the hot season.

The young leaves of this tree look blanched; hence its name of "Chinese lettuce". It is said to be indigenous in the Eastern Islands, and is now very commonly cultivated in our gardens on account of its foliage, which the Bombay Flora is responsible for saying becomes darker in the shade.

This tree attains a height of 15-30 ft., sometimes even more, and a circumference of 2-4 ft.

Seldom cut down for its wood.

MYRISTICACEÆ.

Myristica attenuata, Wall.; Dalz. & Gibs. Bby. Fl. 4. *Ramphala* or *manpatri.*

A very tall, handsome tree. Leaves 5-8 by 1¾-2¾ in., oblong-lanceolate, long, attenuated, acute or rounded at the base, membranaceous, glabrescent when old, sub-furfuraceous in the midrib and veins, glaucous beneath; lateral veins 12-20 on each side; petioles

Timber Trees.

¾-1 in. Flowers sub-globose, peduncles axillary, woody, fascicled, short, few-flowered; pedicels longer than the peduncles or nearly equal; bracteolate about the middle. Calyx sub-globose, scurfy. Anthers 12, round a flat disc. Fruit oval or oblong, tawny-tomentose, 1-2 in. long. Aril very thin-lobed at the apex.

At Khardála. Common on the gháts and the hills of the Konkan. Fl. October-November.

M. Malabarica, Lamk.; Dalz. & Gibs. Bby. Fl. 4. *Ranjaiphal* or *manpatri.*

A tall, elegant tree; branchlets glabrous or minutely puberulous with a reddish bark. Leaves 4-8 by 1½-2½ in., narrow, oblong or elliptic, lanceolate, acute or obtuse at the apex, acute or rounded at the base, glabrous on both sides, dull-coloured above, dull-brown or whitish beneath, petiole ½-1 in., channelled above. Male flowers more numerous and smaller than female ones on axillary cymes 1-3 in.; pedicels 2-6 lin.; perianth sub-globose, 3-4 cleft at the apex. Anthers 10-15, covering more than three-fourths of the column. Female peduncles axillary, 4-8 lin., usually simple, bearing 3-6 flowers; pedicels 3-4 lin. Fruit 2½-3 in. by ½-1 in., oblong. Aril orange-red, lobes twisted and folded into a cone at the top.

Common in the dense forests of the Konkan and Malabár. Fl. November-February; Fr. June, the nutmeg remaining a long time on the tree.

The wood of both this and the preceding is said to be white, close-grained and hard, but not much used, as it is said to be liable to attacks from insects. *M. Malabarica* yields a variety of nutmeg which when bruised and subjected to boiling furnishes a considerable quantity of a yellow concrete oil said to be an efficacious application to indolent ulcers, allaying pain, and inducing healthy action. It is used as an embrocation in rheumatism, for which purpose it is melted down with a small quantity of cocoanut oil. The oil is also employed to adulterate true nutmeg oil with; as is the aril, which is not very aromatic, to mix with that of the true nutmeg.

M. moschata, the true nutmeg, a native of the Eastern Islands, is also cultivated in Bombay, Goa, Konkan and various parts of India near the sea-coast.

The wood is said to be hard and close-grained, but is not much used, the tree being chiefly valued on account of its aromatic nut.

LAURINEÆ.

Cinnamomum Zeylanicum, Breyn.; D. C. Prod. xv. i. 13; Brand. For. Fl. 375. *Dalchini, tikhi* (at Goa), *taj, canella* (Portug.).

A middle-sized tree, small branches quadrangular. Leaves 3-5 by 1½-3 in., rigid, more or less coriaceous, elliptic-lanceolate, obtusely pointed at the apex, more or less acuminated and sometimes unequal at the base, glabrous and shining above, glaucous beneath, 3-5-nerved, petiole 4-8 lin., long-channelled. Flowers tomentose, 3-lin., usually hermaphrodite, on long terminal, corymbose panicles equalling the leaves, the ultimate ramifications 3-flowered.

Cultivated and wild (?) in Bombay, Konkan, Cochin, Ceylon and other parts.

Alt. 8000 ft.

This evergreen attains a height of 30-40 ft. and 4-5 ft. of girth. Fl. throughout the year, but abundantly in January-February; Fr. June-August. Sheds and renews foliage in May. Timber Trees.

The wood is whitish, becoming brown on exposure, and close-grained. Every part of the plant when bruised gives a powerful odour of cinnamon. The bark is used as a condiment and also for medicinal purposes, and from it, as also from the leaves, an oil is extracted. From the root-bark camphor is prepared.

C. iners, Rwdt.; D. C. Prod. xv. i. 19.. *Tikhi.*

Leaves 4-8 by 1-3 in., oval or oblong-lanceolate, attenuated at both ends, usually strongly 3-nerved a little from above the base, glabrous above, glaucous beneath; petiole about ½ in. Flowers small, white, on slender pedicels of about the length of the calyx, forming long-peduncled, axillary or terminal cymose panicles equalling or exceeding the leaves. Calyx usually silvery-silky; lobes falling off at the middle. Fruit oblong, smooth, brown, embraced at the base by the thickened 6-lobed calyx.

Common in the forests of the Konkan, Malabár, etc.

Height 30-50 ft., with a girth of 3-4 ft. Fl. in the cold season.

The wood is brown or pale-brown, heavy and close-grained. The bark and the leaves are used for curries, and their aroma varies in different parts.

Machilus macrantha, Nees.; Dalz. & Gibs. Bby. Fl. 221. *Kurma* (Kán).

A middle-sized or large tree; branches spreading. Leaves 3-8 by 2-3 in., ovate or elliptic-oblong, acute or obtuse, glabrous above, glaucous beneath; petiole 1-1¾ in., channelled. Flowers yellowish, 4-6 lin., on a large, terminal, white, pubescent panicle about as long or longer than the leaves. Berry globose, ¼-⅜ in., black.

Common at Parvar and other gháts; also in the western forests of the Madras Presidency and in Ceylon.

Alt. 1-6000 ft.

Fl. March-April; Fr. in the rainy season.

The wood is light and even-grained, and is used for building purposes.

M. glaucescens, described by Dalz. & Gibs., appears to be a variety of this, but the leaves are smaller, and the panicles usually corymbose equalling the leaves.

Beilschmiedia Roxburghiana, Nees.; Dalz. & Gibs. Bby. Fl. 222; Brand. For. Fl. 378. *Maida-lakdi.*

Leaves 4-6 by 1½-2 in., sub-opposite or alternately elliptic-oblong, acuminate, obtuse, coriaceous, glabrous, shining above, and marked with prominently reticulate veins below; petiole ½-1 in. Flowers whitish or yellowish-white on axillary racemes the length of the petiole or longer. Peduncles, pedicels and calyx pubescent, glands and staminodes yellow. Fruit 1½-2 in., oblong, dark-purple when ripe, grey-tomentose.

Common on the gháts, Eastern Bengal, Nepaul, Oude forests and Burma.

Attains 20-30 ft. in height (sometimes more) and 4-8 ft. in girth. Fl. April-May.

Timber Trees.

The wood is dark-grey and is used for building purposes, etc.

B. fagifolia is closely allied to the above species, if not the same.

Tetranthera laurifolia, Jacq.; Brand. For. Fl. 379.—*T. apetala*, Dalz. & Gibs. Bby. Fl. 222; also called *maida-lakdi, garbijaur, menda*.

Branchlets, inflorescence and leaves more or less pubescent, the last named becoming often glabrate when old. Leaves 5-10 by 2½-4 in., alternate, oblong-lanceolate or elliptic-lanceolate or obovate, shortly acuminate or obtusely acute; acute or cuneate at the base, pale beneath, coriaceous. Flowers minute, yellowish, 8-12 in a head forming pedunculate umbels or corymbs of about the length of the petiole or a little longer; involucre of 4 concave bracts; perianth truncate. Stamens about 14, alternating with as many or more staminodes. Berry globular, size of a pea, smooth, black and almost dry when ripe, resting on the club-shaped perianth.

Found at Vengúrla and on the gháts; Southern India, Madras, Ceylon, Bengal, Burma and other parts of India.

Alt. 4500 ft.

This evergreen attains a height of 40-50 ft. with a cicumference of 4-5 ft. Fl. May-July; Fr. in October.

The wood is greyish brown, close-grained and durable. The bruised leaves have the smell of cinnamon.

T. Wightiana, Wall.—*Cylicodaphne Wightiana*, Dalz. & Gibs. Bby. Fl. 222. *Keyngi*.

Branchlets and under surface of the leaves clothed with rusty brown pubescence. Leaves 3-8 by 1-3 in., elliptic or oval or obovate-oblong, obtuse or acute, rounded or attenuated at the base, green and glabrous above, usually tomentose or sub-glabrous below; veins prominent; petioles 3-8 lin. Flowers in axillary, solitary racemes shorter than the leaves, clothed with rusty pubescence; involucre 4-6-flowered. Berry nearly ½ in. long, nearly half-immersed in the cup-shaped truncated tube of the calyx.

This handsome large tree is common in our gháts; also in Kánara down to Cape Comorin, and Assam.

Alt. 2000 to 8000 ft.

The wood is yellowish, with a dark heart, and is used for rafters and other economical purposes.

Actinodaphne Hookeri, Meissn.; Brand. For. Fl. 381.—*A. lanceolata*, Dalz. & Gibs. Bby. Fl. 312. *Pisa*.

A small or middling-sized tree; young shoots and petioles rusty-tomentose. Leaves 3-9 by 1¼-2 in, in whorls of 5-8, more or less 3-nerved at the ends of branches, elliptic-lanceolate, or ovate-lanceolate, acute or acuminate, narrow, rounded at the base, glabrous in age, dark-green and shining above, glaucous beneath; petiole 3-8 lin., tomentose. Flowers axillary, fascicled, few-flowered, covered with sub-orbicular golden scales. Fruit somewhat like an acorn, oblong, resting on a concave cup.

Very common at Mahábaleshvar, Máthcrán, along the Western Gháts, Kánara, Sátára, in some parts of the Madras forests, and in Sikkim.

Alt. 5000 ft.

This evergreen shrub becomes a small tree in protected situations. It Fl. from September-November, and Fr. March-May. Timber Trees.

Litsæa Zeylanica, Nees.; Dalz. & Gibs. Bby. Fl. 223; Brand. For. Fl. 382. *Belori* at the Nilghiries, *kanwal, sara, chirchira.*

A large tree, glabrous; leaf-buds and pedicels pubescent with minute hoary tomentum. Leaves 3-6 by 1-2 in., elliptic-oblong, lanceolate, acuminate, narrow at the base, thinly coriaceous, glaucous beneath; petiole ½-1 in. Flowers yellowish-white, short-pedicellate, in dense, axillary, 6-12-flowered clusters; perianth segments ovate-oblong. Glands of the two inner anthers stipitate. Berry ⅓ in. diam., globular.

At Parvar Ghát, Nilghiries, mountains of Southern India from 2-6000 ft., Ceylon, Hongkong and Queensland.

This evergreen attains a height of 20-30 ft. and a girth of 3-4 ft. Fl. March-May, and Fr. at the end of the rainy season.

Alseodaphne semecarpifolia, Nees.; Dalz. & Gibs. Bby. Fl. 222. *Wiwarana, raani.*

A glabrous tree, except the young shoots, which are tawny-pubescent. Leaves 3-9 by 2-4 in., ovate or obovate-oblong, obtuse at the apex, narrowed at the base, rigidly coriaceous, green, shining above, glaucous beneath; veins reticulated; petiole ½-¾ in.; panicles axillary, or from the scars of the fallen leaves. Berry ½ in. long, oblong.

Found along the whole of the Western Ghâts as far as Cape Comorin and in Ceylon.

Alt. 5000 ft.

This is also an evergreen tree; it attains a height of 25-30 ft. Fl. in the cold season, and Fr. in the hot season.

The wood is of a yellowish or pale-brown colour, strong, and is used for building purposes. Boats are also built from it, as it is not attacked by teredo.

Cryptocarya Wightiana, Thw.—*C. floribunda*, Dalz. & Gibs. Bby. Fl. 222. *Golu-mora* (Ceylon).

A glabrous tree; young shoots and leaves minutely tawny-pubescent. Leaves 2-6 by 1-2½ in., on petioles 3-9 lin., elliptic or ovate-oblong, acute or acuminate at the apex, obtuse or acute at the base, rigidly coriaceous, glabrous and shining above, pubescent on the veins beneath. Flowers yellow, small, numerous, shortly pedicelled on terminal or terminal and axillary panicles, yellowish-tomentose. Fruit oblong, ½ in. long, black when ripe.

Common at Talwaddi, and all along the Western Ghâts down to Ceylon.

Alt. 2-5000 ft.

This evergreen grows to a height of 20-35 ft.

It yields a large wood considered valuable for building purposes.

THYMELACEÆ.

Lasiosiphon eriocephalus, Dcne; Dalz. & Gibs. Bby. Fl. 221.

A tall shrub or small tree with willow-like alternate, lanceolate, acute leaves 2-3 by ½-1 in., and pretty yellow flowers in capitules.

Timber Trees.

Very common at Mahábaleshvar, Máthcrán and other gháts in this and the Madras Presidency; found also in Bengal and Ceylon.
Alt. 5000 ft.
This tree attains a height of 25 ft. in good situations. It Fl. November-February, and continues in flower up to April.
The bark is used to intoxicate fish.

EUPHORBIACEÆ.

Euphorbia neriifolia, Linn.; Dalz. & Gibs. Bby. Fl. 226; Brand. For. Fl. 439. *Thōr, nivalkanti* at Goa.

Branches obsoletely 5-angled, spirally twisted, stipulary spines twin, black. Leaves 6-12 near the ends of branches, oblanceolate, otbuse, narrowed into a short petiole with dichotomous cymes of 3-15 red flower heads.

Wild and cultivated in the Konkan, Deccan and most parts of India.
Alt. 5,000 ft.
Height 20 ft.; girth 3 ft. Fl. February-April; Fr. in the rainy season. Sheds foliage October-December; the new re-appearing towards the beginning of the rainy reason.
The slightly acrid milk is used as a mild vesicant in painful affections, and the root mixed with pepper is employed as an antidote in snake-bites. The plant is used for hedges.

E. nivulia, Ham.; Dalz. & Gibs. Bby. Fl. 225; Brand. For. Fl. 439. *Sij, newrang.*

A shrub or a small tree; branches round, armed with stipulary twin spines. Leaves 6-12 in., glabrous, fleshy, entire, obovate, veinless. Flowers yellowish in short, peduncled, 3-flowered cymes arising from the scars of the fallen leaves. Capsule 3-lobed.

Found in Gujarát and Sind; also in Madras and the dry hills of Garwhal.
Height 15-20 ft.; girth 1½-2½ ft. Fl. in March, and Fr. towards the end of the hot season. Is leafless in the cold season, the foliage being renewed about the beginning of the rains.
Wood yellowish and loose-grained; useless as timber.

E. antiquorum, Linn.; Dalz. & Gibs. Bby. Fl. 226; Brand. For Fl. 438. *Sihunda* (Sansk.), *tidhára sehnd* (Hind.)

A glabrous shrub or small tree; branches obsoletely 3-5-angled. Leaves minute, fleshy, or wanting. Flowers yellowish; peduncles solitary or in pairs arising from a little above the fallen leaves, usually with 3-flower heads, the centre head fertile. Capsule deeply 3-lobed.

Common in the dry hills of Sevundrug, Ghorgam, Madras, Bengal and Burma.
Height 15-20 ft., sometimes more, with a girth of 1½-3 ft. Fl. February-March and Fr. at the beginning of the rainy season. Leafless in the cold season.
The wood is white, light, soft, but even-grained.

E. tirucalli, Linn.; Dalz. & Gibs. Bby. Fl. Suppl. 75; Brand. For. Fl. 439. *Smooth milk-bush, sehnd* (Hind.), *nival* (Goa).

A glabrous tree or shrub; branches unarmed, terete, not angled. Leaves ½-¾ in., fleshy, linear. Flower-heads yellowish-white, crowded at the ends or forks of the branchlets. Capsule deeply 3-lobed, dark-brown.

Indigenous in Africa, and naturalized all over India. Timber Trees.

Height 20 ft.; girth 1-2 ft Fl. April to June, and Fr. at the end of the rainy season.

The wood of the old plant is white, tolerably close-grained, strong and not attacked by insects. It is used for rafters, etc. The milky juice of the branches is extremely acrid and vesicant, and is employed in the Southern Marátha Country and Goa to poison fish. The tree is often planted as a hedge, and though unarmed, cattle avoid it from fear of the acrid juice. The fresh milky juice is employed for the removal of warts, and mixed with any bland oil is used as a rubefacient embrocation in rheumatism; it is also considered as a specific in syphilis.

Actephila excelsa, D. C. Prod. xv. ii. 222.—*Anomospermum excelsum,* Dalz. & Gibs. Bby. Fl. 233.

A tall shrub or small tree, monœcious or occasionally diœcious. Leaves 3½-8 by 1-2½ in., alternate, coriaceous, entire, shining, glabrous above, paler beneath, elliptic-lanceolate, acuminate at the apex, and narrow acute at the base on petioles 3-8 lin. Stipules scale-like, glabrous or hairy. Flowers axillary, male crowded, sub-pedicelled; female larger and on longish pedicels usually solitary, mixed with the male, or in separate axils. Calyx-lobes glabrous, or hairy, larger than petals. Capsule about 1 in. diam., depressed, globose, smooth; pedicels drooping.

Found at Phonda Ghát, Konkan, Malabár, Madras to Cape Comorin, Silhet, Kassia, Ceylon, etc.

Alt. 5500 ft.

Fl. April-May.

Phyllanthus emblica, Linn; Brand For. Fl. 454—*Emblica officinalis,* Dalz. & Gibs. Bby. Fl. 235. *Aolá, amla, aonli.*

A glabrous tree. Leaves ½ in. by 1½-2 lin., distichous, alternate, linear-oblong, sessile, imbricate, on 4-8 in. long branchlets having the appearance of pinnate leaves. Flowers numerous, small, yellowish, on small slender pedicels, on axillary fascicles, or on the naked portion of the branch below the leaves. Calyx 6-parted, usually glabrous, glands 6, one between each of the segments. Staminal column slender, short, bearing 3-5 oblong anthers. Ovary 3-celled, glabrous. Styles 3, twice 2-cleft. Berry globose, ¾ in. diam., fleshy, smooth, 6-striated, pale-yellow.

Common in Bombay in the plains and forests; found also in Madras, Burma, Ceylon, etc.

Height 30-40 ft.; girth 3-6 ft, sometimes more. Fl. March-May; Fr. October-February. Is leafless in the hot season.

The wood is mottled, of a red-brown and yellow colour, hard, close-grained, takes a fine polish, and is durable under water. It is used for building purposes, well-rings, etc. The fruit (emblic myrobalan) is eaten raw and pickled; it is also used for dyeing and tanning, and is highly valued in the treatment of diarrhœa and dysentery. The bark, which is also astringent, is employed for the same purpose. It is stated that chips of the wood or small branches thrown into muddy water have the property of clearing it; hence the wood is often employed, as stated above, for making well-rings.

P. polyphyllus, Willd.; Dalz. & Gibs. Bby. Fl. 234.

This species much resembles the preceding, but is principally distinguished from it by its small dry fruit and triangular lanceolate stipules.

Timber Trees.

Fringes the banks of the Krishna and other rivers towards the ghâts. Common in the ravines at Mahábaleshvar, Nilghiries, Mysore and Ceylon.

P. distichus, Müll.—*Cicca disticha*, Dalz. & Gibs. Bby. Fl. Suppl. 78. *Country gooseberry, harpharuri* (Hind.)

A glabrous tree. Leaves 1-3 by 1½ in., numerous, alternate, short-petioled, obliquely ovate-lanceolate (lowermost sometimes orbicular). Flowers minute, red, numerous, in globular heads at the axils of the fallen leaves, male, female and hermaphrodite mixed. Calyx segments 4; disc of 4 glands. Stamens 4, three shorter than the calyx. Ovary ovate; styles short; stigmas 3, 2-cleft. Drupe 6-8-grooved, globular, size of a gooseberry, pale-yellow.

Cultivated in gardens; not found wild.

Height 25-30 ft., with a girth of 2-3 ft. Fl. April-May, when the tree is leafless.

The fruit is eaten raw and pickled, and is made into preserves and used for tarts.

P. Indicus, Müll.—*Prosorus Indicus*, Dalz. & Gibs. Bby. Fl. 236.

A small diœceous tree. Leaves 2-4½ by 1-2 in., oblong, elliptic-lanceolate, membranous, entire, on petioles 2-5 lin. Male flowers small, numerous-fascicled, on pedicels 3-4 lin.; disc convex; female solitary or in threes on pedicels 4-5 lin. Styles 3, bi-fid at the apex. Capsule globose, depressed, small, bluish. Seed purplish-blue.

Found in the ghâts, Konkan, Madras Presidency and Ceylon.

Alt. 3000 ft.

Fl. and renews foliage in March.

The wood is white and tough, and is used for building purposes in Ceylon.

P. cynospermum and **P. Stocksii** described by De Candolle have a close affinity to the preceding.

P. lanceolarius, Müll.; Brand. For. Fl. 453.—*Golchidion lanceolarius*, Dalz. & Gibs. Bby. Fl. 235. *Bhoma*.

A glabrous tree; branchlets obsoletely triangular. Leaves 3-6 by 1-2 in., elliptic or elliptic-oblong, acute at both ends, short-petioled, coriaceous, shining. Flowers pale-green in axillary fascicles; male, numerous, fasciculate, on long filiform peduncles; female, few, sessile. Male calyx segments 6, unequal. Stigma 6-8-toothed. Capsule ½ in. diam., depressed, sulcate. Seed red.

Common in Máthérán and the ghâts, Malabár, Kánara, Nepaul, Eastern Bengal, Burma, Oude forests.

This is an evergreen attaining a height of 25-30 ft. and a girth of 2-3 ft. It Fl. from December-April and Fr. during the rains.

The wood is hard and durable, and is used for building purposes.

Müller in De Candolle, and Beddome in "Flora Sylvatica" describe, besides the above, the following shrubs or small trees of this genus as existing in the Konkan:—

P. nitidum.	*P. diversifolium.*
P. tomentosum.	*P. Malabaricum.*
P. Ohenackii.	*P. juniperioides.*
P. asperum.	*P. Lawii.*

Melanthesopsis patens, Müll.; Brand. For. Fl. 455.—*Melanthesa turbinatha*, Dalz. & Gibs. Bby. Fl. 234. Timber Trees.

A glabrous shrub or tree; branchlets 4-angular. Leaves ½-1 in., oval-obtuse or almost orbicular, entire, short-petioled, sometimes unequal-sided. Flowers, small, greenish, short-pedicelled, axillary, solitary or by pairs. Male calyx turbinate, 6-lobed; female calyx 6-lobed enlarging with the fruit; styles 3, 2-lobed; capsule size of a pea, rather dry and red when ripe, supported by the enlarged red calyx.

Common in Bombay island and the Konkan forests; also in Madras and Bengal.

This tree is generally 3-6 ft. high, and sometimes more. It Fl. March-May.

Putranjiva Roxburghii, Wall.; Dalz. & Gibs. Bby. Fl. 236; Brand. For. Fl. 451. *Puta-jan, putra-jiva, jiv-putrak, jewan-putr.*

Young shoots and petioles pubescent. Leaves 3-5 by 1-1½ in., elliptic-oblong, acute at both ends, on petioles 3-4 lin., sub-coriaceous, often unequal at the base, serrulate, glabrous and shining above; stipules deciduous. Flowers small, yellow; male numerous, sub-sessile in globose axillary heads; calyx 3-5-cleft; stamens 3; filaments more or less connate; female flowers solitary or 2 together, axillary, pedunculate; calyx segments 5-6; ovary pubescent, 3-celled; styles 3, dilated into large usually triangular stigmas. Fruit oval, 7-10 by 5-8 lin., smooth, white; nut pointed, very hard, rugose, 1-seeded.

Found at Khándala, Nagotna, Kenery and Alibág forests and in Belgaum; also in Bengal, Burma, Southern India and Ceylon.

Alt. 2500 ft.

This evergreen shady tree attains a height of 40-50 ft. with a girth of 4-5, sometimes 9 ft. It Fl. March-May and Fr. next cold season Foliage renewed in April.

The wood is white or light-grey, even-grained and durable;—used in tanning. The nuts are made into necklaces for children to keep them in health; hence the name *putra-jiva.* The leaves are lopped for fodder.

Securinega obovata, Müll.; Brand. For. Fl. 455.—*Fluggea virosa*, Dalz. & Gibs. Bby. Fl. 236. *Kodarsi, dalme, ghari, darim.*

A glabrous shrub or tree; branchlets angular. Leaves 1-2½ by ½-1 in., oval, or obovate, sub-sessile. Flowers minute, yellowish, diœcious, in axillary fascicles. Styles 3, 2-cleft. Capsule size of a pea, white, globose.

Found in Bombay, Nepaul, Bengal, Southern and Central India, Ceylon, Burma, &c.

Alt. 5000 ft.

Height 15-25 ft.; girth 3-4 ft. Fl. May-July and Fr. July-October. The timber is white or yellowish, close-grained, strong, durable, and not attacked by insects. It is used for agricultural implements. The bark is astringent, and is used to intoxicate fish. The fruit is eaten.

S. leucopyrus, Müll.; Brand. For. Fl. 456—*F. leucopyrus*, Dalz. & Gibs. Bby. Fl. 236.

Timber Trees.

A large spinescent shrub or small tree; glabrous. Leaves 1-2 by ½-1 in., on petioles 1-2 lin., ovate, usually retuse, thin coriaceous. Flowers diœcious, yellowish or greenish-yellow, on slender pedicels in axillary fascicles; male flowers numerous, 5-androus; styles 3, 2-cleft. Fruit size of a grain of pepper, white, globose, 3-coccous.

Common in the Konkan, Madras, Bengal, Ceylon, Sind, Garwhal and Sikkim.

Alt. 5000 ft.

Attains a height of 12-15 ft. with a girth of ¾-1 ft. Fl. throughout the year, but chiefly April-June; Fr. July-September.

The wood is pink, hard, close-grained; of no economical value. The fruit is eaten.

Bischoffia Javanica, Bl.; Brand. For. Fl. 446.—*Stylodiscus trifoliatus*, Dalz. & Gibs. Bby. Fl. 235. *Boke, korsa, iram.*

A glabrous tree. Leaves 3, rarely 5-foliolulate, 8-12 in., of which the common peduncle measures 3-5 in.; leaflets 3-6 by 1¼-2, short-petiolulate, elliptic-lanceolate, long-acuminate, crenate. Stipules minute, caducous. Flowers greenish; male small on short pedicels in axillary panicles; female on stronger pedicels in branched panicles or simple racemes. Drupe size of a small cherry, round, bluish-black, globose.

Common on Chorla Ghát, Konkan, Madras forests, Bengal, Burma, Indian Archipelago, Southern China, etc.

Alt. 5000 ft.

Height 30-40 ft., sometimes 70; girth 3-4 ft and sometimes 7 ft.;—in dry places a stunted tree 12-15 ft. high. Fl. February-March; fruit ripens May-June.

The wood is red, fine, hard, durable, and fine-grained. Used for furniture, buildings, bridges, and other works of construction.

Hemicyclia sepiaria, W. & A.; Dalz. & Gibs. Bby. Fl. 229; Bedd. Fl. Sylv. 298.

A large or middle-sized glabrous tree. Leaves 1½-2 by ¾-1¾ in., elliptic-ovate or obovate-obtuse or retuse, coriaceous, entire or repand-denticulate. Flowers numerous, whitish, minute; male 7-11-androus around a flat disc; no rudiment of an ovary; sepals 4, concave, pubescent outside; female sub-sessile. Ovary crowned with 2 sessile stigmas. Drupe red, globose.

Found in the forests of the Konkan, Malabár and Ceylon.

Alt. 3000 ft.

The wood is very hard, close-grained, and resembling boxwood.

H. venusta, Wight.; Dalz. & Gibs. Bby. Fl. 229; Bedd. Fl. Sylv., 298.

A small tree with drooping branches; young shoots pubescent. Leaves 3-4 (sometimes more) by 1-1½ in. on petioles 3-4 lin., oblong-elliptic, lanceolate, long-acuminated, coriaceous, entire, glabrous, with a few hairs below. Flowers tomentose; male flower in axillary fascicles; calyx 4-parted; rudiment of ovary minute or obsolete. Stamens 5-9, female in pairs, rarely more. Stigma large, sessile.

Found in Dhárwár, South Kánára as far as Tinnevelly.

Alt. 2-4000 ft.

Fl. May-June.

The wood is very hard.

Cyclostemon Indicum, Müll.; D. C. Prod. xv. ii. 481; Bedd. Fl. Sylv. 199. Timber Trees.

A large glabrous tree. Leaves 3-5 by 1-2 in., ovate or elliptic-lanceolate, long-cuspidate, acuminate, narrow or acute at the base, on petioles 2-3 lin., entire, thin, membranaceous, reticulately veined.

Flowers,—pedicels slender about as long as the petioles; male calyx ciliate at the margin; anthers 4-6; disc central, thick, undulated, sub-lobed; female calyx and pedicels silky pubescent. Ovary silky, styles slender, peltiform at the apex.

Found in the Konkan, Malabár and Kánara.

Aporosa Lindleyana, Wight.; Bedd. Fl. Sylv. 286.—*Scepa Lindleyana*, Dalz. & Gibs. Bby. Fl. 236. *Sala* (Kán).

A small or middling-sized glabrous tree; diœcious; young shoots puberulous. Leaves 4-6 by 1½-2¼ in., alternate, entire, ovate-lanceolate, or oblong-acute at the apex, attenuated and obtuse at the base on petioles 3-4 lin.; stipules caducous. Flowers yellowish, male in sessile, often forked catkins about 1½ in., solitary or 2-3 together, axillary or below the leaves, bracts broad, fimbriate. Calyx segments 4-6, ciliate; anthers 2; female in solitary or twin cymose spikes. Calyx segments 5. Ovary ovoid, pilose, 2-3-celled. Stigma bi-fid. Fruit sub-globose, ½ in. long, generally 2-celled, of which one is abortive.

Common in Southern Konkan, Madras, Bengal, Ceylon, etc.
Alt. 4000 ft.
This evergreen flowers in the cold and sometimes in the rainy season; Fr. April-September.
The wood is yellowish and soft, and is used for building purposes.

Antidesma Ghæsembilla, Gœrtn.; Brand. For. Fl. 446.—*A. paniculata*; *A. pubescens*, Dalz. & Gibs. Bby. Fl. 237. *Jondri.*

Branchlets, young leaves and inflorescence tawny or greyish-pubescent. Leaves 1½-3½ in., oval or obovate, elliptic or nearly orbicular, rounded or slightly cordate at the base, on petioles 3-6 lin. Flowers greenish-yellow in dense paniculate spikes; male spikes 1-2 in., female somewhat shorter, tomentose. Calyx deeply 5-7-parted. Drupe ovoid, dark-purple when ripe.

Found in the Konkan, chiefly at Vengúrla, the forests of Madras, Ceylon, Bengal, Burma, Oude and Nepaul.
Attains a height of 20-25 ft. and a girth of 1-2 ft. Fl. April-June; Fr. in the rainy season.
The wood is hard, close and even-grained, whitish or reddish, and adapted for cabinet-work. The fruit is eaten on account of its pulp, which is agreeably acid; the leaves are said to be also eaten in Bengal. The bark is used for making ropes.

A. diandrum, Tul.; Dalz. & Gibs. Bby. Fl. 237; Brand. For. Fl. 447. *Amli, dakki.*

A small glabrous tree; young shoots and petioles pubescent with rust-coloured hairs. Leaves 2-4 by 1-2 in., oblong or ovate, lanceolate, on a petiole 1-2 lin., membranous. Flowers greenish-yellow, minute, on short pedicels in axillary and terminal spikes, solitary or 2-3 together; male spikes 2-3 in., female shorter. Calyx

Timber Trees.

4-5-toothed. Stamens usually 2 or 3. Styles 3. Drupe obovate, purple, small, succulent, 1-celled.

Found at Vengúrla in the Konkan, Southern India, Bengal, Behár, Oude, Kumaon, Java, etc.

Attains a height of 12-20 ft. and a girth of 1-2 ft. Fl. May-June; Fr. December-January. Leafless in the hot season.

The wood is pinkish, hard, smooth, close-grained, and takes a fine polish, but is apt to split and warp. The fruit, which is acid, is eaten; the leaves are made into chutnies.

Briedelia retusa, Sprang.; Brand. For. Fl. 449.—*B. montana*, Dalz. & Gibs. Bby. Fl. 233. *Asáána, gunjan, kati-ain, phathur-phod, khaja, gauli.*

Branches occasionally spinescent when young; young shoots and underside of leaves usually pubescent or tomentose. Leaves 3-6 by 3½ in., elliptic-oblong or elliptic-obovate, obtusely pointed, retuse or emarginate at the apex, rounded or slightly cordate at the base, entire or slightly crenulated, coriaceous, glabrous above, glaucous or more or less hairy beneath; petioles 3-4 lin. Flowers greenish-yellow, monœcious on very short pubescent pedicels, numerous, in solitary axillary clusters, or forming spikes in the axils of the leaves, and often panicled at the end of the branchlets. Petals of male flowers on long claws; disc 5-lobed; fruit globular, size of a pea, succulent, black when ripe.

Found on the gháts, where it is common, in Máthcrán, in the ravines of Mahábaleshvar, throughout the Konkan, Oude forests, Satpura range, Bengal, Burma, Ceylon, etc.

Attains a height of 30-50 ft. and a girth 5-6 ft. Fl. April-July; Fr. October-January. Sheds leaves March-April; renews May-June.

The wood is yellowish or dark-olive brown, durable, takes a fine polish, is even-grained and hard. Used for house-building and in the construction of carts. The bark is astringent, and is used for tanning, and the leaves for fodder. The fruit is eaten.

De Candolle Prod. ii. 500 describes another species,

B. Hamiltoniana, as existing on the Konkan Gháts. It is a small tree with membranaceous leaves 2-3½ by 1-1½ in., and flowers in heads subtended by leaves of bracts.

Cleistanthes Malabaricus, Müll.; D. C. Prod. xv. ii. 508.

A small tree; branchlets rufo-villous, at length glabrous. Leaves 3-5 by 1-1½ in.; obovate-lanceolate, shortly cuspidate, acuminate, glabrous above by age, rufescent-pubescent beneath, narrowed at the base, on a very short, densely, rufo-villous petiole. Stipules longer than the petiole, acuminate. Flowers glomurate, sessile or sub-sessile in the axil of the leaves. Calyx segments glabrous. Petals obovate-spathulate, slightly 3-lobed. Ovary with tawny hairs. Fruit globose, 3-celled.

Found in the Konkan and Malabár.

Croton oblongifolium, Roxb.; Dalz. & Gibs. Bby. Fl. 231; Brand. For. Fl. 440. *Gunsur, gansurang* (Goa).

Young parts and inflorescence clothed with silvery scales. Leaves 5-10 by 3½-4 in., oblong-lanceolate or elliptic-obovate, acute or

acuminate, pale-green, glabrous, dentate, crowded towards the apex of branches, petioles 1-2 in.; stipules small, caducous. Flowers small, yellowish-green, male and female together on short pedicels in the axils of minute bracts in long terminal racemes. Calyx segments 5; petals woolly; stamens 10-12; styles 3, 2-cleft. Capsule sub-globose, 3-lobed, 3 lin. diam. Timber Trees.

Found in Southern Konkan (not very common), Madras, Behár, Bengal, Burma, Ceylon, etc.

Height 20-30 ft., sometimes 40; girth 2-3 ft. Fl. February-April; seed ripens April-May. Is leafless in the hot season.

The wood is white, close-grained, and hard. The bark and fruit are extensively used, externally in rheumatic swellings of the joints, and internally in cases of pneumonia.

C. aromaticus, Linn.; D. C. Prod. xv. ii. 588.

A very scabrous shrub or small tree, with ovate, long-petioled leaves, with glands at the base. Stamens 10-30, and capsules globose or ellipsoid.

Common in the Konkan, Malabár and the Nilghiries.

C. tiglium, Linn.; D. C. Prod. xv. ii. 600; Roxb. Fl. Ind. iii. 682. *The purging croton, jepál, jamal gota.*

A small tree or shrub. Leaves ovate, acuminate, or acute, serrate, sometimes entire with 2 glands at the base. Flowers greenish-yellow. Stamens 15-18. Capsule 3-cornered, rather large, ellipsoid.

C. Malabaricum, Bedd. Fl. Sylv. 204.

A tree 20-30 ft. high, closely resembles *C. reticulatum* of Müller and *C. hypoleucas.*

Symphyllia mallottiformis, Müll.; D. C. Prod. xv. ii. 764.

A small tree or shrub. Leaves 3-4½ by 1-2 in., not approximated at the apex of the branches, alternate, oblong-elliptic, entire, acute at the apex, obtuse at the base; short-petioled, puberulous when young, glabrous by age. Flowers in dense heads, arranged in spikes, a little shorter than the leaves; male flowers numerous, shortly pubescent, longer than the pedicels. It is said to resemble *Mallotus Lawii* to be hereafter described, but has alternate instead of opposite leaves, and destitute of glands beneath.

Aleurites Moluccana, Willd.; Dalz. & Gibs. Bby. Fl. Suppl. 76.; Bedd. Fl. Sylv. t. 276. *Akrut, hijli buddam,* Belgaum walnut.

Young shoots covered with a brownish stellate tomentum. Leaves 4-8 by 3-6, collected at the ends of branches, ovate-lanceolate, acute or acuminate, often 3-5-lobed and covered with a brownish or whitish tomentum when young and glabrous when old, cordate or obtuse at the base with 2 glands at the insertion of the petiole; petiole 2-3 in. Flowers numerous, rather small, white, on large terminal panicles; male flowers usually at the ends of the branches of the panicles; female flowers sessile in the divisions of the panicles. Calyx both of male and female pubescent or tomentose. Styles 2, 2-cleft. Drupes 1-2 in. diam., fleshy, a little compressed, olive-coloured, containing 2 or by abortion a single hard 1-seeded nut.

Timber Trees.

A handsome tree indigenous in the Malayan Archipelago, and now cultivated and run wild in many parts of Bombay, Madras and various other parts.

It attains 40-60 ft. in height and 5-6 ft. in girth. Fl. in hot season and Fr. in rainy season. It is an evergreen tree.

Wood said to be white, soft, and of no value. The kernel is eaten, but is inferior in taste to that of the walnut. They yield about 50 per cent. of a fine, clear oil called Keeuna, which is used for food and burning. "In the Sandwich Islands a large trade is carried on in this oil, and the kernels strung on sticks are employed as candles; they burn well and slowly and give a clear light." The oil-cake is said to be good food for cattle.

Trewia nudiflora, Linn.; Dalz. & Gibs. Bly. Fl. 231.; Brand. For. Fl. 443. *Pettari*, a name also given to *Mallotus ripandus; tumri bhillaura.*

The young parts more or less pubescent. Leaves 4-9 by 3-5½ in., cordate or broad-ovate, sub-glabrous in age; on petiole 1½-3 in. Flowers greenish-yellow; male in pendulous, many-flowered racemes, 4-9 in. long; pedicels about1 lin.; female on longer pedicels, solitary or in few-flowered racemes. Calyx segments caducous. Drupe globose, hoary, mucronate, about 1 in. diam.

Very common throughout the plains of the Konkan, Madras, Ceylon' Oude, Kumaon, Burma, Java and Sumatra.

Alt. 3000 ft.

Attains a height of 60-70 ft. and 6-7 ft. in girth. Female trees are usually smaller. Fl. November-April; Fr. rainy season. Leaves resemble those of *Gmelina arborea* and *Thespesia populnea*, and are shed January-February, and renewed March-April.

Wood white, turning yellow, moderately tough, soft, not durable. Used for native drums and agricultural implements. The fruit is eaten.

Mallotus albus, Müll.; Brand. For. Fl. 444.—*Rottlera mappoides*, Dalz. & Gibs. Bby. Fl. 230.

Young parts and inflorescence tawny or white, with dense stellate tomentum. Leaves 4-8 in. long and nearly as broad, cordate, subpeltate, acuminate, entire or obsoletely sinuate-toothed, sometimes lobed, furnished with 2 or sometimes 3-4 glands at the base on the upper side; alternate, glabrous above by age, rusty or white tomentose below; petiole 1-4 in. Flowers very shortly pedicelled; the males in small, almost sessile heads; females solitary and larger, arranged in terminal, more or less elongated panicle. Male calyx 3-4 or rarely 5-parted; stamens about 80; female calyx 4-5-cleft. Ovary densely puberulous, warty. Capsule globular, tubercled, usually tetra-coccous, about 4 lin. broad.

In the Konkan, Southern Marátha Country, forests of Madras, Ceylon, Bengal, Indian Archipelago.

Alt. 4000 ft.

This evergreen ree is dœcious and attains 30-40 ft. in height and 3-4 ft. in girth. F. April and May; Fr. July and August.

Wood is white and soft—uses not known.

M. Philippinensis, Müll.; Brand. For. Fl. 443.—*Rottlera tinctoria*, Dalz. & Gibs. Bby. Fl. 230. *Shendri, kamela.*

Branchlets, inflorescence and under surface of leaves hoary. Leaves 3-9 by 2-2½, alternate, ovate or ovate-lanceolate, acuminate or obtuse, glabrous, with minute red glands beneath and 2 depressed glands at the base above, entire, coriaceous, or sometimes slightly toothed; petioles 2-3 in. Flowers white and yellow, small, sessile or sub-sessile, in axillary and terminal paniculate spikes; calyx furnished with red glands; stamens about 26. Ovary tomentose, 3-celled; styles 3, thickly plumose. Capsule ⅓ in. diam., 3-lobed, 3-celled, 3-valved, covered with a red powder. Timber Trees.

Common in the plains and the ghâts of the Konkan, Madras, Bengal, Ceylon, Central India, Burma, Indian Archipelago and North Australia. Alt. 4500 ft.

This is an evergreen, diœcious tree attaining the height of 25-30 ft. with a girth of 3-4 ft. Fl. September and December; Fr. February and May.

Wood light-brown, hard and close-grained. Too small to be used for any economical purpose. "The berries of this tree at a certain stage of their ripeness are really brown, but are covered with a thick coating of red dust. This dust is the *kâmala* of commerce, and can be collected easily by plucking the bunch of berries gently, and rubbing them between the palms of the hands over a cloth spread out to catch the dust. If the berries are plucked too early, this dust is mixed with another sort, of a greenish tint, which destroys the value of the article, and if not plucked at the right time, the dust will all disappear, being blown away by the wind, leaving the berries of a greenish-brown colour, and of no value. This article, *kâmala*, finds a ready market, and is now worth one shilling and sixpence per pound."

M. aureopunctatus, Mull.—*Rottlera areopuncta,* Dalz. & Gibs. Bby. Fl. 230.

A small diœcious tree or shrub found in the forests of the Konkan and Mira Hills.

M. Lawii, Müll.; D. C. Prod. xv. ii. 974.

A tall shrub or small tree found in the Konkan and Malabâr. It has a close affinity to *M. muricatus and stenanthus,* but the female calyx is spathaceous.

M. stenanthus, Müll.; D. C. Prod. xv. ii. 972.

Also a small tree or shrub found in the forests of the Konkan.

M. repandus, Mull.—*R. decocca* of Dalz. & Gibs. Bby. Fl. 230. *Pettari.*

This is a weak, scandent shrub common in the Southern Konkan, Madras, Bengal and the Indian Archipelago.

Cleidon Javanicum, Bl.; *Rottlera uranda,* Dalz. & Gibs. Bby. Fl. 230.

Young shoots puberulous. Leaves 4-7 by 1½-3 in., lanceolate or elliptic-lanceolate, acute or acuminate, glabrous, distantly serrated, sometimes furnished with 2 glands at the base on the upper side. Petiole slender, 1-2 in., channelled; stipules acuminate, deciduous; male flowers small, on slender pedicels, in small clusters, 2-5, arranged in axillary slender racemes; female flowers longer on a long pedicel, solitary in the axil of the leaves. Ovary 2-3-celled; styles 2-3

Timber Trees.

united at the base, 2-cleft. Capsules 2-3-coccous, about 1 in. diam. Seeds variegated, size of a large pea.

Common in the forests of the Konkan, Madras, Travancore, Ceylon, Bengal, Burma, &c.

Alt. 2000-3000 ft.

This evergreen tree attains the height of 15-20 ft., sometimes 30-40 ft., and 3-4 ft. in girth. Fl. February and March ; Fr. May and July.

Wood yellowish-white, rather heavy, close-grained, takes good polish, but said not to be durable. In Madras it is used for building purposes.

Macaranga Indica, Wight.—*M. Roxburghii,* Dalz. & Gibs. Bby. Fl. 228. *Chanda.*

Young parts covered with rusty-coloured tomentum; branchlets glabrescent, glaucescent. Leaves 5-9 in. long, orbicular-ovate or ovate, acute or acuminate, broadly peltate at the rounded base, sub-entire or serrated at the margin, glabrous above and softly pubescent and gland-dotted beneath and on the upper side near the base with several large impressed glands. Male and female flowers minute, in panicles ; males in dense clusters, supported by a linear bract, bearing a large, elliptic, shining, disc-shaped gland ; the female flowers on rather long pedicels supported by elliptic bracts, but without glands. Stamens 6-8. Ovary usually 1-celled. Capsule globular covered with resinous points.

Common at Mátherán, Khandála, Pal Ghat, the forests of the Konkan, Nilghiries, Travancore. Not found as yet at Mahábaleshvar.

Alt. 3000 ft.

This evergreen tree attains 20-40 ft. and sometimes 50 ft. in height, with a girth of 3-4 ft., sometimes more. Fl. in December and January ; Fr. April and May.

Wood greyish-red, somewhat hard.

Trigonostemum Lawianum, Nimmo. ; Bedd. Fl. Sylv. 273. —*Croton Lawianum,* Dalz. & Gibs. Bby. Fl. 232.

A tall shrub or small glabrous tree. Leaves 1-6 in. by 1½-2 in., elliptic-ovate or lanceolate, short-petioled, coriaceous, entire or slightly crenulated, glanduloso-punctate at the margins. Stipules triangular. Flowers white, on pedicels 1-8 lin., forming terminal and axillary sessile or shortly pedunculate cymes. Male calyx 5-toothed; petals 5. Disc consists of 5 rufo-pubescent glands, alternate with petals; stamens 10-14 in., 2 or 3 series; filaments more or less connate below; female calyx larger, deeply 5-fid, enlarging with the fruit; petals as in male. Disc annular. Ovary silky puberulous; styles 3, erect. Capsule 5-12 lin. diam., smooth, supported by the enlarged foliaceous calyx. Seeds smooth.

Common at Bhímáshankar, Mira Hills, and throughout the Konkan, from Kánara down to Travancore and Ceylon.

Alt. 3500 ft.

Givotia Rottleriformis, Griff. ; Bedd. Fl. Sylv. 285 ; Brand. For. Fl. 442.

A small or middling-sized, diœcious tree; young shoots, inflorescence and under side of leaves densely grey-tomentose with stellate hairs. Leaves 4-6 by 3½-6 in., alternate, broadly ovate or rotundate acute at the apex and a cordate base, sometimes slightly lobed and

distantly crenate, glabrous by age, but grey tomentose beneath; petiole 3-5 in., sometimes with 2-3 glands above the middle. Flowers in axilliary slender panicles, 5-10 in. Calyx 5-cleft. Petals alternating with the sepals. Disc somewhat lobed, pubescent. Styles 2-cleft to the middle. Fruit oblong, ellipsoid, fleshy, size of a pigeon's egg; seeds globose, pale-coloured. Timber Trees.

North Deccan (rare), Southern Marátha Country, Mysore and Ceylon. Fl. in hot season; Fr. September-October.

Wood white, light and soft, but even-grained; is used to make toys, imitation fruit, boxes and other fancy articles which are lacquered and painted, as the wood takes paint very well. The seed yields an oil which is well adapted for lubricating fine machinery.

Ricinus communis, Linn.; Dalz. & Gibs. Bby. Fl. Suppl. 78. *Castor-oil plant, rund, ind, erund.*

The *Castor-oil plant, hirund,* is cultivated throughout India, and often found run wild. It is a large shrub or small tree.

Wood very soft and light, too small to be adapted for any economical purpose. Usually cultivated for the sake of the oil which is extracted from its seed, and which is employed in medicine as a purgative, in lamps, and in lubricating machines. It is also grown in Assam and other parts for the sake of its leaves on which silkworms *(Attacus Ricini)* are fed.

Excœcaria insignis, Müll.; Brand. For. Fl. 442—*Falconera Malabarica,* Dalz. & Gibs. Bby. Fl. 227. *Dudla, ucla, kirad, lendwa, khinna.*

Glabrous tree. Leaves 4-8 in. by 1½-3½ in., oblong-lanceolate, acuminate, dentate, membranaceous; petiole 1-2 in. with 2 circular glands at the apex. Flowers small, sessile, in long, naked, terminal spikes; male and female flowers in distinct branches; bracts minute; male many-flowered; female 1-flowered. Ovary 2-3-celled on the same or different plants. Capsule ¼ in, ovoid, 2-3-celled.

Grows sparingly in the forests of Máthcrán, Násik, Khandála to Vengurla; common at the latter place. Also in Kumaon, Burma, Chittagong, &c.

Alt. 5500 ft.

Attains 20-30 ft. in height and in favourable places 50-60 ft., with a girth of 4-6 ft. and sometimes 11-12 ft., though usually cut down for posts and other minor purposes. Fl. January-March; Fr. May-June. Destitute of leaves during the cold season; leaves renewed about the beginning of the rains.

Wood greyish-white, very soft and spongy, used for cylinders of native drums and sandals. The whole plant is full of acrid juice, which when applied to the skin produces vesication.

E. Indica, Mull.; Brand. For. Fl. 441. *Hurna.*

A small evergreen tree, said to exist in the Konkan.

Wood soft, white, chiefly used for fuel. The seeds are used to poison fish.

E. agallocha, Willd.; Dalz. & Gibs. Bby. Fl. 227; Brand. For. Fl. 442.

Evergreen, small, glabrous, with coriaceous, elliptic-lanceolate, cordate, serrulate leaves. Flowers small, yellowish-green, in axillary catkins; male several together; female solitary. Capsule 3-lobed, size of a cherry.

Timber Trees.

Found along the coast; in the Konkan, Madras, Bengal, Indian Archipelago and North Australia.

It attains a height of 15 25 ft., with a girth of 2-3 ft. Fl. January-March. Fr. May-June.

Wood—character and uses much the same as the preceding. Juice acrid and poisonous.

E. oppositifolia, Jack., D. C. Prod. xv. ii. 1219.

Small, evergreen, glabrous tree, 20-25 ft. in height. Leaves opposite, elliptic-lanceolate, acuminate, crenate-dentate. Flowers small, yellowish; male several to each bract; female solitary axillary. Capsule 3-coccous, size of a cherry.

Grows in the Konkan, Malabar, Mysore and Tenasserim.

URTICACEÆ.

Debregeasia longifolia, Wedd.; Brand. For. Fl. 405.—*Oenocephalus niveus*, Dalz & Gibs. Bby. Fl. 239. *Kapsi.*

A tall shrub or small tree; branchlets pubescent. Leaves 3-6 by 1-2 in, lanceolate, oblong-lanceolate, acute or acuminate, sinuate, membranous, rough above, prominently reticulated and covered with a white or grey tomentum beneath, 3-nerved; petiole ½-1 in. Flowers monœcious in heads or clusters, on dichotomous, axillary, puberulous cymes, solitary or twin.

Common in jungles of Savantvádi, the Konkans up to Mahábaleshvar; Madras, Ceylon, Kumaon, Nepaul, Burma and Java

Alt. 5000 ft

Evergreen tree 15-25 ft. in height and 1-1½ ft. in girth. Fl. in the rainy season; Fr. October January.

Wood reddish-brown, hard, but too small to be used for any economical purpose. The fibre of the bark is sometimes used in making ropes and fishing nets.

Morus alba, Linn.; Dalz. & Gibs. Bby. Fl. Suppl. 80; Brand. For. Fl. 407. *Mulberry tree, tut, chinni, sutur* or *shah-tut.*

Glabrous tree; branchlets, petioles and under side of leaves slightly pubescent. Leaves 2-3 in., ovate, acute or acuminate, cordate at the base, dentate or variously lobed, 3-nerved, petiole ½-1 in. Flowers monœcious; the male and female often on distinct branches.

Is cultivated in many parts of India, and found sparingly in the Bombay gardens.

Ascends in Ladak to 11,000 ft.

Attains 30-40 ft in height and 6-8 ft. in girth, sometimes more. Fl. March and April; Fr during the rainy season. Sheds its leaves during the cold season, renews February-April.

Wood yellow or reddish brown, hard, even-grained, seasons and polishes well. Used for building and agricultural purposes. The leaves serve as fodder, and in some places to feed silkworms. The fruit is eaten.

M. atropurpurea, Roxb. This is specially known as *shah-tut.*

Grows well in gardens, attaining sometimes a large size, having cordate, coriaceous and often lobed leaves, and dark-purple, cylindric fruit. This is said to be a variety of *M. alba.*

M. Indica, Linn.; Dalz. & Gibs. Bby. Fl Suppl. 80; Brand. For. Fl. 408. *Tut, tutri, shah-tut, ambor.*

Glabrous shrub or small tree, young parts sparingly pubescent. Leaves 2-5 in. on petiole ½-2 in., ovate, long-acuminate, coarsely and unequally serrate, sometimes lobed, 3-nerved. Male spikes ½-in. long, axillary, on slender peduncles 2-3 lin. Female spikes shorter, on slender peduncles. Fruit globose or ovoid, small, purplish-black. Timber Trees.

Wild in the Sub-Himalayan tract, hills of the Punjáb and Kumaon. Alt. 5000-7000 ft.

This is the mulberry which is cultivated in Bengal, Burma. It was formerly cultivated in Ahmednagar, Poona and Bombay for the sake of its leaves, which are used for feeding silkworms. It is now sparingly found in native gardens.

Attains 20-25 ft. in height, sometimes more, with a girth of 16-18 in. Fl. February-March; Fr. May-July. Leafless in the cold season.

Wood, yellow, mottled, hard and close-grained.

Streblus asper, Lour.; Brand. For. Fl. 410.—*Epicarpurus orientalis*, Dalz. & Gibs. Bby. Fl. 240. *Karera, kharaoli, karchanna, rusa.*

All parts harshly hoary. Leaves 2-4 by 1-2 in., elliptic, rhomboid, oblong or obovate, obtuse or shortly acuminate, irregularly dentate, rough on both sides with minute raised dots; petiole 1-3 lin. Male flowers in short, pedunculate, globose, axillary heads. Female axillary 1-2 together on slender longer peduncles. Drupe size of a pea, 1-seeded, yellow, partly enclosed in the enlarged perianth which is also yellow.

Common in Bombay, Madras, Ceylon, and throughout India, Burma, Siam, etc.

Attains the height of 25-35 ft. and a girth of 3-4 ft., sometimes more; generally a small scraggy-looking tree. Fl. January-March; Fr. May and July. An evergreen tree, but renews its leaves in March.

Wood white, moderately hard, tough and elastic, and is used for cart-wheels and building purposes. The twigs are used as tooth brushes, and the rough leaves in polishing wood and ivory.

Artocarpus integrifolia, Linn.; Dalz. & Gibs. Bby. Fl. 244; Brand. For. Fl. 425. *Jack-tree, phanas, kanthal.*

This is a large tree, wild, and cultivated throughout India. Alt. 4000 ft.

Attains 40-60 ft. in height and 6-10 ft. in girth, sometimes larger. Fl. December-February; Fr. April and July.

The wood is of a yellow colour when fresh cut, and reddish-brown when seasoned; even-grained, hard, seasons well, and takes a beautiful polish, and is used for carpentry, boxes, furniture, etc. A yellow dye is made of its wood to dye clothes. The fruit of young trees is borne on branches, while on older trees the fruit is borne on the trunk and near the root. The ripe fruit is eaten; and the white milky juice is used as bird lime.

A. lakoocha, Roxb.; Brand. For. Fl. 426; Dalz. & Gibs. Bby. Fl. 244. *Lakuch, dheu, wutma, dephul.*

Branchlets and under side of leaves downy. Leaves 6-10 by 2-6 in., oval or ovate or oblong-ovate, obtuse or short-acuminate, coriaceous, glabrous and shining above and soft tomentose below; petiole ½-1 in. Stipules small, caducous. Aments of both sexes on very short peduncles, axillary and solitary, the male generally on the lower axils, irregularly roundish or oblong, yellow, size of a nutmeg;

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female on the upper axils. Fruit size of a man's fist, sometimes larger, soft-pubescent, yellow when ripe.

Karanja and Bassein sparingly, Goa, Madras, Bengal, Kumaon, Ceylon and Burma.

Alt. 4000 ft.

Attains 40-60 ft. in height; girth 6-10 ft. or more. Fl. February-April; Fr. rainy season.

Wood pale brown or yellow, rather coarse, with a dark heart wood, takes a fine polish, and is used for furniture and canoes. The male flower heads are pickled. The fruits are acid and are eaten; they are collected before being ripe; and after being cut into slices, freed from seeds are dried in the sun, to be subsequently used in curries on account of their acid flavour.

A. hirsuta, Lamk.; Dalz. & Gibs. Bby. Fl. 224; Brand. For. Fl. 226. *Pat-phanas, ran-phanas, hebalsu.*

Young parts hirsute. Leaves 6-12 by 4-6 in., ovate or elliptic, acute or obtuse, entire or occasionally serrate, glabrous above, hairy especially in the nerves beneath; petiole 6-12 lin., female oval, size of an egg, on long peduncles about 3 in.

Found in Pant Sachu's Country, jungles of the Konkan and Madras up to about 4000 ft.

It is a very lofty, evergreen tree attaining sometimes the height of 200 ft. (Beddome) with a trunk of great girth. Fl. January-March; Fr. beginning of the rains.

Wood hard, yellowish-brown, strong, close-grained, durable, and much used for house and ship-building, furniture, etc.

A. incisa, Linn.; Dalz. & Gibs. Bby. Fl. Suppl. 79; Brand. For. Fl. 426. *Bread-fruit tree.*

A middle-size tree. Leaves large, roundish, pinnatifid; lobes oblong-acute. Male calyx bifid. Fruit round, size of a pumaloe, muricated, somewhat like jack-fruit.

Native of South Sea Islands and cultivated throughout India, Ceylon and Burma. The ripe fruit is not palatable. The green fruit cut in slices is eaten as vegetable. Seed size of a large pea, is eaten roasted; tastes like that of chestnut.

Antiaris toxicaria, Lesch.—*A. innoxia*, Brand. For. Fl. 427. —*A. saccidora*, Dalz. & Gibs. Bby. Fl. 244. *Jasund.*

Glabrous tree; branchlets sometimes pubescent. Leaves 4-8 by 2-2¼ in., on a petiole 3 lin., elliptic-oblong, acuminate, rounded or cordate at the base, entire, scabrous. Male flowers axillary, crowded on a thick, flat receptacle; calyx lobes 4; stamens 3-8. Female flowers solitary, enclosed in an involucre of imbricate bracts. Styles 2. Fruit size of a filbert, 1-seeded, purple when ripe.

Khándála and the forests of the Konkan, Sávantvádi, Madras, Ceylon and Burma.

A gigantic evergreen tree attaining a height of 100-250 ft., and of enormous girth, reaching sometimes to 30 ft. Fl. August-October; Fr. cold season.

Wood white or pale-brown, soft, even-grained, and of no commercial value. It exudes a white resinous substance, used in poisoning arrows. The nuts are intensely bitter, and contain an azotised principle. The inner bark yields a strong, tenacious fibre of which rope is made. Sacks are also made of this bark to carry rice, the process being described in

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Graham's Catalogue of Bombay Plants, p. 193, thus:—"A branch is cut, corresponding to the length and diameter of the sack wanted. It is soaked a little, and then beaten with clubs until the *liber* separates from the wood. This done, the sack formed of the bark is turned inside out, and pulled down until the wood is sawed off, with the exception of a small piece left to form the bottom of the sack, and which is carefully left untouched. These sacks are in general use among the villagers for carrying rice."

The genus **Ficus** is represented by numerous species—trees and shrubs—some of enormous size; but their wood is soft, and not of any commercial value.

Ficus Bengalensis, Linn.; Brand. For. Fl. 412.—*Urostigma Bengalense,* Dalz. & Gibs. Bby. Fl. 240. *Vad (war), bar, bargat.* This is the *banyan tree* of Europeans.

A large, evergreen tree attaining 50-70 ft. in height, sometimes a 100 ft. and a girth of 20-25 ft.

Common throughout India.

Alt. 4000 ft.

Fr. March-May, and remains long on the tree.

This tree sends down many aerial roots which dipping into the earth take root and grow into trunk, and thus serve as supports to the horizontal branches, and for increasing the diameter of the crown. Sykes mentions one in the Poona Collectorate with 68 stems descending from the branches and capable of affording shade to 20,000 men.

Wood grey, soft, and of little value; durable under water, and hence used for well work and in some places for boxes and window panels. The wood of the aerial roots is stronger, tough, and is used for tent poles, cart yokes, and poles for carrying loads. From the coarse fibre of the bark and small roots ropes are made, and these are used for slow matches. Bird-lime is made of the milky juice. Leaves are used in lieu of plates by Brahmins. Lac is sometimes collected in Ceylon and other parts.

F. mysorensis, Roth.; Brand. For. Fl. 414.—*Urostigma dasycarpum,* Dalz. & Gibs. Bby. Fl. 242. *Goni* (Kán.)

Young parts and fruit covered with dense tomentum. Leaves 5-9 in., on petiole 1-1½ in., ovate or ovate-elliptic, acuminate, coriaceous, glabrous by age; primary veins 8-12 on each side, confluent at the margins, much reticulated and prominent beneath. Figs twins, axillary, sessile, globular or ellipsoid, size of a small cherry, red. Bracts 3, small, pubescent.

Found in the Konkan, Malabár, Mysore, Ceylon and Burma.

A large evergreen tree 50-60 ft. in height and a girth of 4-5 ft. Fr. March-May.

F. infectoria, Willd.; Brand. For. Fl. 414.—*U. infectorium,* Dalz. & Gibs. Bby. Fl. 241. *Pipli, bassari, pakri, kaim.*

A large tree. Leaves 4-8 in., oblong, acutely acuminated, obtuse or rounded or sub-cordate, entire or waved, membranous; petiole 2-3 in. Fig. ¼ in. diam., twin, globose, white when ripe.

Common in the Konkan up to Mahábaleshvar, Bengal, Ceylon, Central Provinces, Punjáb and Burma.

Alt. 5000 ft.

Attains a height of 40-50 ft., sometimes more, with 5-9 ft. in girth. Seldom throws down one or two aerial roots. Fruit ripens May-June. Leaves renewed in February-April.

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Wood grey or brownish-white, moderately hard, but not durable. Young shoots eaten in curries, and leaves are used as fodder for elephants.

F. tsiela, Linn.; Brand. For. Fl. 415.—*U. pseudo-tsiela.*, Dalz. & Gibs. Bby. Fl. 241. *Pipri.*

An immense tree. Leaves 4-6 by 2-3 in.; on petioles 1-1½, alternate, ovate-oblong, pointed, entire, firm, smooth on both sides, shining particularly above. Fruit twin, axillary, sessile, turbinate, size of a cherry, purple when ripe.

At Mahábaleshvar and other gháts of the Konkan, Madras, Bengal and Ceylon.

Ficus religiosa, Linn.; Brand. For. Fl. 415.—*U. religiosum*, Dalz. & Gibs. Bby. Fl. 241. *Pipal, pipul, pipro.*

This is a beautiful evergreen tree, wild and planted throughout India, Ceylon and Burma.

Alt. 5000 ft.

Attains 80-90 ft. in height, and girth 25-30 ft. Fr. during the hot season, and sometimes towards the end of the rainy season. Leaves renewed February-April. Young leaves reddish.

Wood whitish, moderately hard, and used for packing cases, fuel and charcoal. Silkworms (the gori silkworms) feed on the leaves of this tree in Assam. Lac is also said to be produced on the leaves. Tender leaf-buds are eaten as vegetable in Central India by the hill-tribes during times of scarcity.

F. cordifolia, Roxb.; Brand. For. Fl. 416.—*U. cordifolium*, Dalz. & Gibs. Bby. Fl. 242. *Pair.*

A large deciduous tree very much resembling *Pipal*; attaining 40-50 ft. in height and a girth of 7-8 ft.

Found at Mátherán, Mahábaleshvár, Bengal, Central India, etc., ascending to 5000 ft. Fr. in May-June; renews leaves in March.

Wood pinkish-white and very soft, used for charcoal. The fruit is eaten, and the leaves and young branches are cut for cattle fodder. In Assam the tree is cultivated for rearing on it the lac-insect.

F. retusa, Linn.; Brand. For. Fl. 417.—*U. retusum, U. nitidum*, and *U. benyamonium*, Dalz. & Gibs. Bby. Fl. 241 and 242. *Mandruk.*

A handsome evergreen tree, wholly glabrous. Leaves 2-3 in., on a short petiole, oval or obovate, acute or short-acuminate, entire, coriaceous, lateral nerves numerous, not prominent. Fruit globose, solitary, or in pairs, sessile, size of a pea, yellowish.

Wild and cultivated throughout India, Ceylon, Burma, Indian Archipelago.

Attains a height of 30-40 ft., sometimes more, and a girth of 6-12 ft.

Wood reddish-grey, close-grained, light and somewhat hard, used as fuel.

F. elastica, Bl.; Dalz. & Gibs. Bby. Fl. Suppl. 79. *Indian rubber tree, Assam caoutchouc tree.*

It is indigenous in Assam and Sikkim, and is cultivated here in Bombay, but does not afford a good supply of caoutchouc.

F. carica, Linn.; Dalz. & Gibs. Bby. Fl. Suppl. 80. *Fig-tree, anjir.*

Cultivated successfully in Bombay and extensively above the gháts.

F. glomerata, Roxb.; Brand. For. Fl. 422; *Covellia glomerata,* Dalz. & Gibs. Bby. Fl. 243. *Umbar, umari, umbar, gular.* Timber Trees.

Glabrous tree. Leaves 4-6 by 1-2½ in., alternate, entire, acute, smooth on both sides, pale beneath and covered with minute green dots. Fruit large, size and shape of a common pear, purplish when ripe, on peduncles 1½-2 in., arising in short paniculate clusters from the trunk and larger branches.

Common in Mahábaleshvar, Mátherán and other gháts and plains throughout India.

Attains 40-60 ft. in height and girth of 5-8 ft., sometimes more in favourable circumstances. Fr. usually March-July. An evergreen tree, renewing its leaves January-April.

Wood brownish-grey, soft, and not durable, except under water, and hence used for well frames and curbs. The milky juice is frequently used by natives of India in painful affections of the liver and joints; birdlime is made of it. The ripe fruit is eaten, and also the unripe in times of scarcity pounded with rice and made into cakes. The leaves are good fodder for cattle and elephants.

F. hispida, Linn.; Brand. For. Fl. 423.—*Covellia opositifolia; C. dæmonum,* Dalz. & Gibs. Bby. Fl. 243 and 244. *Rumbal dumbar, mira, dhedu.*

Young shoots hispid. Leaves 4-8 in. long, opposite, ovate or obovate-oblong, shortly acuminate, crenate, serrate, more or less rough on both sides, with short stiff hairs; petiole 1-2 in. Fruit ovate or globose, size of a cherry, yellowish, hairy, on peduncles 2-5 lin., arising from the axils of the leaves or from the trunk and branches.

Common in Panch Maháls, in the Konkan, especially near the seaside and throughout India, Ceylon, Burma, the Indian Archipelago and Australia.

Alt. 3500 ft.

Attains usually the height of 20-30 ft., in favourable circumstances more; 3-4 ft. in girth. Fr. April-June. It is an evergreen tree, but the leaves are renewed February-March.

Wood grey, coarse-grained, soft. The leaves are used as cattle fodder.

Celtis Roxburghii, Bedd.; Dalz. & Gibs. Bby. Fl. 237; Brand. For. Fl. 429. *Brumaj.*

A glabrous tree; young parts pubescent. Leaves 3-6 by 2-3¼ in., alternate, obliquely ovate-cordate, long-acuminate, 3-nerved at the base, entire or serrate in the upper half, sub-coriaceous. Petiole 2-4 lin. Flowers greenish-yellow, on slender, pubescent, axillary racemes, or below the leaves; perianth 4-5-divided. Ovary 1-celled, 1 ovule, pendulous from the apex of the cell. Drupe ovate, size of a pea crowned by short styles.

Common in the forests of the Konkan, Madras, Bengal, Punjáb, Burma, etc.

Alt. 3000 ft.

An evergreen tree which attains the height of 25-35 ft., with a girth of 2½-3 ft. Fl. in the cold season, and Fr. April-May.

Wood grey, hard, and close-grained.

Trema orientalis, Bl.—*Sponia orientalis,* Pl.; Brand. For.

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Fl. 430.—*Sponia Wightii*, Dalz. & Gibs. Bby. Fl. 238. *Indian nettle tree, gol, khargul.*

Branchlets more or less pubescent. Leaves 3-5 by 2-2½, ovate-oblong, acuminate, 3-nerved, cordate, and unequal-sided at the base, serrate, more or less rough on the upper side, with white pubescence beneath; petiole 2-3 lin. Flowers greenish, deciduous or polygamous, sessile or sub-sessile, in axillary cymes, usually longer than the petiole. Drupe very small, globose, black when ripe, 1-seeded.

Common in the forests of the Konkan, Madras, Bengal and Ceylon.

This evergreen tree attains the height of 25-30 ft., with a girth of 1½-3 ft. Fl. January-April; Fr. during the rainy season.

Wood reddish-grey, soft; used for charcoal in gunpowder manufacture, and hence it is also called *Charcoal tree.* The inner bark yields tough and strong fibre which is used for various economical purposes.

Ulmus integrifolia, Roxb.; Brand. For. Fl. 431.—*Holoptelea integrifolia*, Dalz. & Gibs. Bby. Fl. 238. *Wawali, woula, keul, papura, dhamna, kumba.*

A glabrous tree; young shoots pubescent. Leaves 3-5 by 1½-2 in., ovate, cordate-ovate, elliptic, acuminate, coriaceous, entire, sometimes unequal base, on a petiole ½ in. Flowers, male and female mixed in short pubescent cymes; perianth hairy, deeply 4-8-parted; segments caducous. Stamens 5-9. Ovary stipitate, compressed, usually 1-celled; styles 2. Samara sub-orbicular, flat, 1 in. long, winged all round, emarginate or 2-cleft at the apex.

Common in Khandála, Nagotna and in many other places of this Presidency; in Madras, Bengal, Ceylon and Burma.

Alt. 2000 ft.

Attains 50-60 ft. in height and 5-12 ft. in girth. Fl. February-March; Fr. during the rainy season. Sheds its leaves October-January; renews March-April.

Wood light yellowish-grey or light-brown, moderately hard, strong; open-grained and light. Used for buildings, carts and carving; also for fuel and charcoal. Leaves are good cattle fodder. An oil is said to be expressed from the seeds in some parts.

CASUARINEÆ.

Casuarina equisetifolia, Forst.; Dalz. & Gibs. Bby. Fl. Suppl. 82; Brand. For. Fl. 435. *Suroka jhar.*

Glabrous, with leafless, drooping branches terminated by whorled, articulate, thin, slender branchlets which are deciduous. Male flowers monandrous, in terminal cylindric catkin, about ½ in.; female flowers in small, pedicillate, globose heads, with conspicuous subulate teeth. Fruit a globular oblong cone, size of a cherry, formed of the enlarged woody bracts and bracteoles, containing samaroid careopsys with a membranous wing.

Indigenous in Chittagong and Burma, Indian Archipelago and Australia. Now cultivated in Bombay, Poona and throughout India.

Evergreen tree 50-80 ft. in height; girth 4-8 ft. Fl. January-March; Fr. in cold season.

Wood white and reddish-brown at the centre, heavy, very hard, cracks and splits, adapted for poles, but is chiefly used as fuel. The bark is

astringent, and is administered in powder or decoction in the cure of chronic diarrhœa and in dressing wounds; it is also useful as a mordant. Timber Trees.

SALICINEÆ.

Salix tetrasperma, Roxb.; Dalz. & Gibs. Bby. Fl. 220; Brand. For. Fl. 462. *Wallung, bucha, bed, baishi.*

Young shoots silky-pubescent. Leaves 4-6 by 1½-2 in., ovate-lanceolate, long-acuminated, entire or serrulated, glaucous beneath, sub-coriacious, lateral nerves prominent. Catkins peduncled or sub-sessile; peduncles with or without leaves. Male aments sweet-scented, yellowish, lax, drooping, 2-5 in. Stamens 5-12, free; female aments greenish, shorter than the male. Ovary stipitate; stigmas 2. Capsule ovate, very small, usually rugose when ripe, 4-6 seeded.

Common on river-banks and in moist places at Mahábaleshvar and throughout the gháts of the Konkan and Madras, and throughout India. Alt. 6000-7000 ft.

Attains a height of 30-40 ft. and a girth of 5-6 ft., and in favourable places 10 ft. Fl. in the cold season; Fr. in the hot. It is an evergreen tree, but renews its foliage February-March.

Wood reddish-brown, soft, porous, not much used; but its charcoal is used in the gunpowder manufacture. Leaves are lopped for cattle fodder, and baskets are made of the twigs. Dalzell says that the bark is used as a febrifuge. Kurz says that it is used for tanning.

CONIFERÆ.

Cupressus torulosa, Don.; Dalz. & Gibs. Bby. Fl. Suppl. 83; Brand. For. Fl. 533. *Himalayan cypress, deodar.*

Branches whorled, with drooping extremities, sometimes erect, forming a pyramidal crown of dark-green foliage; branchlets round or absolutely tetragonous. Leaves very small, ovate-triangular. Cones numerous, ½ in. diam., consisting of rugose scales enclosing several compressed seeds with an orbicular wing.

Native of the Himalayas and Nepaul, and cultivated in Bombay, Poona, Calcutta, etc.

Alt. 3000-5000 ft.

Attains usually 70-80 ft. in height, and a girth of 6-8 ft., and in favourable circumstances much more. An evergreen tree. Fl. January-February. Cones are formed October-November; when this tree has attained a certain height, it dies.

Wood light-brown or yellowish-white, hard, and fragrant. Used for building purposes, etc. In Kullu images are carved of it, and the poles are also made of it to carry the sacred ark. It is often burnt as incense in temples.

C. glauca, Lam.; Dalz. & Gibs. Bby. Fl. Suppl. 83; Brand. For. Fl. 534. *Lusitanian cypress.*

Commonly cultivated in gardens in Bombay, Poona and other towns; but it does not appear to grow well below the gháts. Said to be introduced by the Portuguese into Goa, and thence to other parts of India.

SANTALACEÆ.

Santalum album, Linn.; Dalz. & Gibs. Bby. Fl. 224; Brand. For. Fl. 398. *Chandan, sandal (gandha).*

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Glabrous. Leaves 1½-3 by 1-1¼ in., opposite, ovate-lanceolate, acute, entire, glaucous beneath. Flowers small, yellowish, soon becoming deep purple or blood-red, inodorous, in axillary cymose panicles; perianth segments 4. Disc-lobes large and alternating with the 4 stamens. Stigma 3-4-lobed. Drupe globular, about ½ in. diam., black when ripe.

Indigenous in Southern Marátha Country, in Mysore, hills of the Coromandel Coast, etc. It is planted in Bombay, the Deccan and in Gujarát; it thrives well.

Alt. 2000-3000 ft.

Attains 25-40 ft. in height, with a girth of 3-4 ft. Fl. and Fr. all the year round, but chiefly in March-July.

Sapwood white, inodorous; heartwood yellowish, fragrant, hard and close-grained. The latter is an article of commerce in India, and is exported to China and Arabia, and is also imported into Bombay: used as incense. It is found to be adapted for engraving. Fragrant oil is distilled from the wood, and is used as a perfume and in diseases of the chest and urinary organs.

PALMÆ.

Borassus flabelliformis, Linn.; Dalz. & Gibs. Bby. Fl. 278; Brand. For. Fl. 544. *Palmyra-palm* or *brab tree, tad, tad-mar, targollah* (fruit of *tar*).

Diœcious tree with cylindric stem, surmounted with a terminal crown of fan-shaped leaves 6-10 ft. across, consisting of about 60-80 pinnæ, 2-4 ft. long, shining, folding along the midrib and united to half their length, and bifid at the apex; petiole 2-4 ft. long with spinose borders. Spathes several, incomplete. Flowers pink and yellow; male in drooping, stout, cylindrical catkins, arising in pairs or threes from the branches of the spadix. Calyx and corolla 3-cleft. Stamens 6, inserted in the corolla tube, no rudiment of ovary. Female flowers larger, greenish in paniculate spikes; calyx and corolla 8 or 12 segments, closely imbricate, all similar in colour. Sterile stamens 6. Fruit globose or obovoid, dark-brown, with a tinge of yellow, shining, size of a child's head.

Common in the Konkan, Sind, Madras, Bengal, Ceylon, Burma and the Indian Archipelago.

Attains the height of 40-60 ft., sometimes 100 ft.; girth 5-6 ft. Fl. February-March; Fr. in the cold season. It is said to live over a 150 years.

The outer wood is close-grained, hard and durable, consisting of numerous, dark-brown, vascular bundles of fibres, and is used for posts, rafters and buildings. The stems are hollowed out and used as water-pipes; cut half through lengthwise, serve as open channels. The sweet sap which runs from the peduncles, cut before the flowers are expanded, is collected in earthen pots; sugar and toddy are derived from it; from toddy arrack is distilled. Oil extracted from the nuts forms an important article of commerce. From the thick fibrous rind (coir) ropes and mats are made. The leaves are employed for thatching, and for writing upon with iron styles, and preserved for years.

Phœnix sylvestris, Roxb.; Dalz. & Gibs. Bby. Fl. 278; Brand. For. Fl. 554. *Wild date palm, cafuri, salma, thakil.*

Leaves 7-15 ft., greyish-green, pinnate; petiole short and dilated at the base; pinnæ 6-18 in., alternate, opposite, rigid. Flowers

small, sessile. Calyx and corolla 3-toothed or parted in both sexes. Stamens in male flowers 6, ovary rudimentary; female flowers, carpels 3. Male flowers in compact panicles, 6-12 in. Fruit oblong, reddish-yellow when ripe, about 1 in. long, smooth, supported by the perianth.

Common in Bombay and many parts of India.

Alt. 5000 ft.

Attains 25-30 ft. in height; girth 3-5 ft. Fl. cold season; Fr. May and rainy season.

Wood is light-brown, hard and durable; occasionally used for rafters and water pipes, etc., but it is chiefly cultivated on account of the sweet sap which is extracted during the cold season, by a deep notch being cut into the trunk immediately below the lower leaves. Baskets, mats, etc., are made of the leaves. (*See* Fruits and Vegetables.)

Caryota urens, Linn.; Dalz. & Gibs. Bby. Fl. 278; Brand. For. Fl. 550. *Birli-mhad.*

A beautiful tree, with a smooth annulate stem. Leaves 18-20 by 10-12 ft., bipinnate, on stout, sheathing petiole; pinnæ numerous; leaflets cuneate, triangular, præmorse. Spathes several. Flowers monœcious in long, pendulous, branched spadices. Calyx and corolla 3-parted, valvate; male flowers yellow; stamens numerous, rudiment of ovary none; female flowers greenish or purplish, smaller than male. Staminodes 3. Ovary 1-celled. Fruit roundish or nearly so, size of a nutmeg, brownish, stinging (hence the name *urens*).

Forests of Mahábaleshvar, Khandála and of the Konkan, Madras, Sikkim, Bengal and Ceylon.

Alt. 5000 ft.

Attains the height of 30-40 ft. and a girth of 2-3 ft. Fl. May-July.

Wood hard, strong and durable, used for the same purposes as the above. The leaves yield a strong fibre *kittul*, which is made into ropes, brushes, brooms, baskets, etc. Excellent and durable fishing lines and ropes are made from the fibres of the sheathing petioles and from the rachis of the long spadices. "This tree is highly valuable to the natives of the countries where it grows in plenty. It yields them, during the hot season, an immense quantity of toddy or palm wine. I have been informed that the best trees will yield at the rate of one hundred pints in the twenty-four hours. The pith or farinaceous part of the trunk of old trees is said to be equal to the best sago; the natives make it into bread, and boil it into thick gruel; these form a great part of the diet of those people; and during the late famine they suffered little while those trees lasted. I have reason to believe this substance to be highly nutritious. I have eaten the gruel, and think it fully as palatable as that made of sago we get from the Malay countries."

Areca catechu, Linn.; Dalz. & Gibs. Bby. Fl. Suppl. 95; Brand. For. Fl. 551. *Supari, mari, phopholi, betelnut* or *areca palm.*

Slender, annulate, cylindrical stem. Leaves pinnatifid, 4-5 ft. long, on a sheathing petiole. Pinnæ 1-1½ ft. long, numerous, linear-oblong, slightly falcate; spathe parallel-veined. Flowers monœcious, male and female on the same inflorescence, sessile. Male, calyx and corolla 3-partite; stamens 6, rudiment of ovary sometimes present. Female flowers, ovary 1-celled, surrounded by 6 sterile stamens; stigmas 3. Spikes branched, panicled; the branches bearing numer-

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ous male sessile flowers and solitary female flowers in the forks. Fruit $1\frac{1}{2}$-2 in., ellipsoid, orange-coloured and supported by a persistent perianth.

Cultivated throughout India, below and above the ghâts, in Ceylon, Burma, Siam, Cochin-China and the Indian Archipelago.

Alt. 3000 ft.

Attains usually the height of 40-50 ft., sometimes 100 ft., and $1\frac{1}{2}$-3 ft. in girth. Fl. nearly all the year round.

Wood is hard, and is used for spear handles, bows. The trunk is occasionally used for rafters, and hollowed out for water-channels. The seeds *(supari)* are chewed with lime and the leaves of betel. From the fruit an extract is prepared in some parts of India, which possesses the same properties as the officinal *catechu*, the produce of *Acacia catechu*. The leaves are used to write upon and to wrap up articles; they are also used in lieu of plates. Necklaces and knobs of walking-sticks are made from the seeds, the albumen of which has a beautiful reticulated appearance.

Cocos nucifera, Linn.; Dalz. & Gibs. Bby. Fl. 279; Brand. For. Fl. 556. *Cocoa palm, narel, mhad.*

This useful palm tree is too well-known to require description.

It is almost certain that the Portuguese introduced this tree into West Africa, Cape Verde Islands, Brazil and perhaps into other parts of America.

Calamus rotang, Roxb.; Dalz. & Gibs. Bby. Fl. 279; Brand. For. Fl. 559. *Bet, rattan.*

Stem long, slender, $\frac{1}{4}$-$\frac{1}{3}$ in. diam., articulated, and climbing, to a great extent enveloped in the thorny sheaths of the leaves. Leaves pinnate, 18-36 in., leaflets 4-9 in. long, opposite or alternate, sessile, linear-lanceolate, the margins armed with minute bristles. Sheaths of leaves also armed with long, prickly, whip-like processes. Flowers in long, drooping, decompound panicles; common peduncle of inflorescence armed with recurved prickles. Male flowers greenish; calyx 3-partite. Petals 3, valvate. Stamens 6, surrounding a rudimentary ovary. Female flowers, calyx and corolla as in the male; ovary 3-celled, surrounded by 6 sterile stamens. Styles short, 3-cleft. Fruit $\frac{1}{2}$ in. long, ovoid, straw-coloured.

Rather common in Southern Konkan, Rám Ghat, Madras, Bengal, Oude, Kumaon, Nepaul and Ceylon.

Fl. in the rainy season; Fr. during the cold season.

Used in making door-blinds, baskets, chairs, mats and various other curious things.

GRAMINEÆ.

Arundinaria Wightiana, Nees.; Brand. For. Fl. 563.—*Bambusa arundo*, Dalz. & Gibs. Bby. Fl. 299. *Chiwari.*

A small annual bamboo. Culm much-branched at the nodes. Sheaths striated, hispid or glabrous. Leaves 2-3 in. by 3-12 lin. ovate-lanceolate, acuminate at the apex, rounded and cuneate at the base, on a short petiole, glaucous beneath, with scabrous margins. Sheaths of the leaves sometimes fimbriate; ligula short. Flowers in ample, terminal, leafy spikes 4-8 in. long; branches slender, sometimes with glands in the axils; spikelets $\frac{1}{4}$-1 in. long, 2-8-flowered

purplish, on long filiform pedicels; the lower paleæ or flowering glume 5-7 nerved, the upper one nerveless, cuspidate at the apex. Lodicules 3. Timber Trees.

Found on the ghàts. Attains 6-12 ft. in height. It flowers and dies annually, and springs rapidly again from the root.

Walking-sticks are made of this at Mahábaleshvar; wottle work is also made of it.

Bambusa arundinacea, Retz.; Dalz. & Gibs. Bby. Fl. 299; Brand. For. Fl. 564. *Mandgay* (Dalzell), *wansa, bans.*

A tall-tufted bamboo; culm green, shining, thorny. Thorns (spinescent branches) double and triple, alternate on the joints. Joints 3-4 in. diam. Sheaths of branches deciduous, 12-15 in., white, shining, silvery inside, acuminated at the apex. Leaves 2-8 in. by ¼-¾, thin, lanceolate, pointed at the apex, broad at the base, short-petioled, hispid above and on the margins. Sheaths of the leaves 1-2 in. long, persistent, coriaceous, somewhat downy or glabrous, and somewhat fimbriate at the mouth. Flowers, when the tree is leafless, in large spikes, compound and decompound. Spikelets generally sessile, in dense, half-whorled clusters at the nodes; each spikelet 8-12 in. long, 6-12-flowered. Empty glumes 2-4; flowering glumes 4-10, acuminate or mucronate and sometimes fimbriate. Lodicules 3; stamens 6; anthers with an obtuse point at the apex. Style 2-3-divided; stigmas plumose. Caryopsys ½ in. long, enclosed in flowering glume and paleæ.

Khándesh, Belgaum, forests and hilly parts of the Konkan, Madras, Bengal, Jubulpore and Burma.

Usually 30-70 ft. high, reaching sometimes to 100 ft. Fl. in the hot season once every thirty years, after which it usually dies; Fr. soon after.

It is used for building purposes, scaffolding, ladders, mats, baskets, etc. Used now for paper materials (*see* Fibres). The caryopsis affords food for poor people, especially during famine. (*See* Fruits and Vegetables.)

Bambusa vulgaris, Wendl.; Dalz. & Gibs. Bby. Fl. 299; Brand. For. Fl. 568. *Bamboo, kulna,* or *kullak.*

Culm green or yellow, or mottled green and yellow, unarmed, widely hollow. Leaves 6-10 by ¾-2 in., linear-lanceolate, acute, scabrous on the longitudinal nerves. Sheaths hirsute above, with dark-coloured hairs. Flowers appear when the branches are in leaf. Spikelets ½-1 in., 4-12-flowered, sessile, oblong-lanceolate, compressed so as to appear bifid, on long interrupted paniculate spikes. Empty glumes 2; flowering glume or lower paleæ attenuated at the base, mucronate and ciliate at the apex; the upper paleæ fimbriated at the margin. Lodicules transparent. Anthers tipped with short hairs. Style filiform, 2-3-divided at the apex.

Said to be indigenous in Ceylon up to 2000 ft.; cultivated in the Konkan, Deccan, and various other parts of India.

Attains 20-30 ft. in height; joints 4 in. diam., sometimes more.

Uses same as the above.

Dendrocalamus strictus, Nees.; Brand. For Fl. 569.—*Bambusa stricta,* Dalz. & Gibs. Bby. Fl. 299. *Male-bamboo, bans, bas, udha, baban.*

Timber Trees.

Culm straight, unarmed, nearly solid or with a very small cavity. Sheaths striated, yellowish, 8-10 in. long. Leaves usually 3-9 by ½-1 in., lanceolate, long-acuminate, rough and hairy above and hairy below, rounded or attenuated at the base, on a short petiole. Sheaths hirsute. Spikelets spinescent, in dense, globular, verticelled heads, 1-2 in. diam., in long interrupted spikes. Empty glumes 2-6; flowering glumes usually 2, hairy or spinescent. Stamens 6, connective not apiculate. Ovary stipitate. Style long, hirsute. Stigma plumose. Caryopsis 3-4 lin. long, ovoid, brown, shining; pericarp coriaceous, separable from the seeds.

Common in Bombay, Madras, Punjáb (rare).

Alt. 3500 ft.

Attains the height of 30-50 ft. with ¼-½ ft. in girth, sometimes more. Grows rapidly, and Fl. every year between November and April, and Fr. May-June. It does not die after flowering Leafless during the cold season, and renews its leaves April-May.

Used for boar-spear handles, baskets, wottle works, and for building purposes.*

Oxytenanthera Stocksii, Munro; Bedd. Fl. Sylv. An. Gen. 233.

This tree is said to exist in the Konkan gháts, and that its leaves resemble those of *Dendrocalamus strictus*, but is distinguished from it by the short points to the anthers, and its striated, membranous lower paleæ.

* For a description of the uses of this, see Sections "Fruits and Vegetables" and Herbs, Tubers, &c., used as food during seasons of scarcity.

FOOD PLANTS.

FRUITS, VEGETABLES, PULSES, GRAINS AND CONDIMENTS *

Food Plants

THE plan of grouping together into one single chapter the various articles that are taken as food has been adopted on grounds of expediency. It would evidently be inconvenient and cumbersome to treat of, say, the mango as a fruit in one place, of mango as a pickle in another, of mango jelly or jam in a third, or of the dried strips of green mangoes that enter into the composition of various Indian curries in a fourth. Such a system would cause not only endless reference, but would in no way improve the value of the subject that is being treated. Hence the adoption of the above heading.

Almost all the species of plants belonging to the orders Cucurbitaceæ, Solanaceæ, Dioscorideæ, and Aroideæ contain more or less acrid and poisonous principles. In some these principles are minimised or destroyed by cultivation, although apt to re-appear at times. In others the simple process of steeping in water is enough to effect the desired object; whereas in others, again, boiling once or oftener becomes necessary before the plants can be considered edible and harmless. Some creepers in themselves harmless, when allowed to climb trees that contain poisonous principles, become poisonous by absorption; as is the case with the vanilla creeper which, being sometimes made to climb the euphorbiaceous shrub *Jatropha curcas*, has been stated to become possessed of some of the injurious properties of the latter. This is not at all surprising when we remember that the parasitic plants belonging to the order Loranthaceæ found growing on the nux-vomica tree have been found to contain the deadly alkaloids of the latter.

With the exception of the products belonging to the orders just referred to, the plants treated in this chapter are all more or less wholesome, though, it is perhaps needless to add, not equally nutritious. It is also necessary to exclude the pulse of *Lathyrus sativus* and the grain of *Paspalum scrobiculatum*.

Lathyrus sativus, Roxb. Fl. Ind. iii. 322; Dalz. & Gibs. Bby. Fl. Suppl. 22. *Chuckling vetch;* known in Bombay by the name of *lang*, and in Bengal and the North-West Provinces by that of *kesari* or *teori*.

It is a small, annual, herbaceous, leguminous plant found growing in Europe, Asia and Africa, and is also cultivated in Gujarát, the North-West Provinces and Bengal.

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* For the description of the trees mentioned in this and in the following sections, see the section *Timber Trees*. The description of small plants is rather short.

Food Plants.

'This is a species of wild vetch, the dhall of which is well known to the people of Central and Northern India as producing very injurious consequences when eaten for any length of time. Nevertheless in seasons of great scarcity, when other food-grains are not cheaply procurable, it is freely consumed by the poorer classes. If taken mixed with other sorts of food the use of this grain may be continued for a very long period without producing any dangerous consequences, or perhaps no consequences whatever may follow; but if it forms the sole or principal article of diet, the direst results supervene. At first there is "weakness and irregular motion of the muscles moving the knees, which are bent and moved with a tremulous irregular motion" somewhat like that of chorea. As the disease advances, the lower extremities suffer emaciation, and eventually the patient is completely paraplegic. No case of recovery from this last stage appears to have been recorded.

The disease is one to which attention was first directed in this country by General Sleeman. He was then stationed near Saugor, and says that in the villages about that place the wheat crops were successively destroyed or very deficient in the years 1829, 1830 and 1831. During these three years, however, the kesari had remained uninjured, and large crops of it had been collected upon which the people mainly fed. The result of this food soon made itself manifest. The younger part of the population below the age of thirty began to be deprived of the use of their lower limbs by paralytic strokes more or less severe, and always coming on suddenly, generally when the person was asleep. The subject was taken up by Dr. Kinloch W. Kirk in Upper Sind. A villager had brought him his wife about thirty years old who was suffering from paralysis of the lower extremities. When questioned as to what he thought the cause to be, the man replied: "It is from kesari; we are very poor, and she was obliged to eat it for five months on end." Dr. Kirk hereupon instituted enquiries into the subject, which confirmed the statement; and he adds that "the natives know that this dhall is poison, but they eat it, *because it is cheap*, thinking that they can stop in time to save themselves from its consequences."

Dr. Irving, who went into the subject of palsy caused by the use of *Lathyrus sativus* more extensively, has published long tables showing that, in all the districts of the North-West Provinces where this grain is used as an article of food, injurious effects are believed to follow. He says that, if used occasionally and in small quantity, the results may be constipation, colic, or some form of indigestion; but if freely used, and especially without admixture of any other sort of grain, palsy of the lower limbs is very apt to occur. Dr. Irving's tables further show that these ill-effects are most apt to be produced in the rainy season, and that the great majority of the sufferers are males, the proportion being 6·11 males to only 0·59 females paralysed. He also suggests that the disease known in Bengal as *kumree*, which attacks the loins of horses, may perhaps be due to feeding upon grain largely adulterated with kesari dhall.

There is a form of palsy to be met within the Malabár Coast and Ceylon, formerly named barbiers, which somewhat resembles the disease we have just been speaking about. Its principal characters are, according to Dr. Copland, "tremor with pricking, formicating pain, numbness of the extremities, chiefly of the lower, followed by contractions and paralysis of the limbs, inarticulation and hoarseness of voice, emaciation and sinking of all the vital powers." It is said to be violent on the Malabár Coast during the months of January, February and March, and to attack such as unwarily sleep exposed to the land winds of the morning. Severe cases of this disease are scarcely, if ever, amenable to treatment so long as the season continues and the winds have not shifted, but it readily yields with a change to the eastward.

Now this barbiers has many points of resemblance to the paralysis of *Lathyrus sativus*, but there are well-marked differences which serve to distinguish one disease from the other. The latter generally comes on suddenly at night without any warning, and always in the rainy season, is incurable, always attacks the lower extremities, prefers males to females, the sense of feeling is unaffected, and life itself is not shortened. Barbiers, on the other hand, prefers the cold season, is curable by change and treatment, attacks any portion of the body, shows no preference for either sex, and most decidedly impairs the vital powers. Then the symptoms of barbiers are never attributed to eating any grain. **Food Plants.**

While on this subject it may be as well to mention that there are two varieties of *Lathyrus sativus*, only one of which is supposed by some to be noxious. This theory is, however, one that does not meet much favour, for *Lathyrus sativus* not only produces ill-effects in India, but similar effects have also been observed in Europe, as may be seen from the following extract taken from Don's General System of Gardening and Botany :—

"*Lathyrus sativus* ; native of Spain, France and Italy. The seeds of *Lathyrus sativus* are commonly sown in Switzerland, for soiling horses, under the name of *gosse.* In several parts of the Continent a white, light, pleasant bread is made from the flour of the pulse, but it produced such dreadful effects in the seventeenth century that the use of it was forbidden by an edict of George, Duke of Wurtenberg, in 1671, and was enforced by two other edicts under his successor, Leopold, in 1705 and 1714. Mixed with wheat flour in half the quantity, it makes a very good bread, and appears to be harmless. But bread made with this flour exclusively has brought on a most surprising rigidity of the limbs in those who use it for a continuance, in so much that the exterior (extensor ?) muscles could not by any means be reduced or have their natural action restored. These symptoms usually appear on a sudden without any previous pain. The disease was regarded as incurable, and being neither very painful nor fatal, those who were seized with it usually submitted to it with patience. Swine fattened with this meal, lost the use of their limbs, but grew very fat lying on the ground. A horse fed some months on the dried herb was said to have his legs perfectly rigid. Kine are reported to grow lean on it, but sheep not to be affected. Pigeons, especially young, lose the power of walking by feeding on the seeds. Poultry will not readily touch it, but geese eat it without any apparent damage. In some parts of Switzerland cattle feed on the herb without any apparent harm."

Duvernoy Fubbroni of Florence says that—

"The Government there had cautioned the peasants against the use of *Lathyrus sativus* in 1786 ; swine having lost the use of their limbs and became pitiable monsters by being fed on the pulse exclusively. The peasants, however, eat it boiled or mixed with wheat flour in the quantity of one-fourth without any harm-"

Nor are the ravages that arise from the use of this dhall confined to man. Horses are believed to be equally subject to its ill-effects ; but it is not yet established how far cattle, poultry, &c., are susceptible to its baneful influences. I may, therefore, perhaps avail myself of the present opportunity to call the attention of the members, principally of such as have frequent occasions to travel in the interior, to this subject, in the hope that they may, when occasions arise, investigate the subject, and thus help to throw light upon an as yet unsettled question.

Paspalum scrobiculatum, Roxb. Fl. Ind. i. 278 and 279; Dalz. & Gibs. Bby. Fl. Suppl. 97. *Kodra, kodri, pakodri.*

It is a graminacoeus plant, about 1-2 in. high. Grows in hilly parts about the commencement of the rainy season; the grain becomes ripe for harvest in November and December.

Several varieties of this grain are mentioned by the natives, the differences in them being probably due to differences in the soil, method of cultivation, &c. Two sorts are, however, well known : the wholesome and the unwholesome. The former is smaller and paler than the next, and goes by the name of *pechadi* or *harkin* in the Konkan. In Goa it is called *pakod.* The unwholesome variety is called *dhone* or *mojari*,

Food Plants.

harik in the Konkan and *māna kodra* in Gujarát. In Sanskrit it is named *kodrava* (injurious). The grain is the only poisonous part of the plant.

Although the two principal varieties have been styled respectively wholesome and unwholesome, the arrangement is only one of convenience, for all the varieties are, as a matter of fact, more or less poisonous, and the highly poisonous seed of one locality when sown in a different soil from that which produced it, may yield a grain whose properties have become either modified or intensified according to the peculiarities of the two localities.

The black kodra, decidedly the most poisonous, shows, according to Surgeon-Major Pirie, the following characters under the microscope :—"The outer coat or husk has a dark outline of a fungus-like character and on the internal surface appears to consist of minute roundish cells containing dark sporules." Several authorities have failed to recognize this fungus-like character in which is supposed to reside the poisonous principle ;—the fact, however, that kodra grain freshly reaped if left unstacked in the fields for some days when it was rainy and wet had become possessed of decidedly more poisonous properties than grain from the same field harvested and stacked when the weather was dry,—together with the generally acknowledged truth that a very poisonous seed has under peculiarities of soil and cultivation yielded a comparatively harmless grain seems to bear out the fungus theory. Nevertheless the subject is one that can hardly be supposed to be sufficiently studied, and demands a great deal of close investigation. Though every part of the grain is poisonous, the husk and testa are more so ; hence the natives take good care to separate the light grain, by means of water in which it floats, from the heavy and less injurious one.

Kodra grain is a common article of food with all the poor people in India. They prepare it by macerating it for 3 or 4 hours or more in a watery solution of cowdung, when the scum and hollow grain which rise to the surface are separated, and the good grain removed and spread out in the sun to dry. This process is repeated so long as any poison is suspected to remain in the grain. Boiling does not entirely destroy the poison, but if the grain is kept for a number of years its poisonous properties are found to diminish. When required for use it is ground in earthen mills, which remove the pericarp and then pounded and winnowed, which separates the different layers of the testa, and leaves the grain fit for use. Kodra is cooked sooner than common rice, and is very commonly used in the Konkan, where it is generally eaten both by men and cattle with whey, which latter is supposed to have the property of neutralizing its poison. Notwithstanding all precautions, however, cases of poisoning do occasionally occur, though they seem rarely attended with fatal consequences. Surgeon-Major Pirie, who has described a case of kodra poisoning (*vide* Transactions of the Medical and Physical Society of Bombay, 1869, No. 9, New Series) thus enumerates the symptoms :—

"Unconsciousness, delirium with violent tremors of the voluntary muscles, pupils dilated, pulse small and weak, skin cold and covered with profuse perspiration, and difficulty in swallowing."

Fourteen persons belonging to four indigent families were taken to him suffering from the above symptoms. They had come on about 6 hours after the kodra had been eaten, and in extreme cases had lasted 18 hours. All had recovered under emetics, stimulants, warm clothing, and heat applied to the surface.

It will have been remarked by such members as belong to the medical profession that the symptoms given above are much like those of poisoning from datura, except the tremors, which are not met with in the last.

The regular use of kodra seems to establish a sort of tolerance of the

grain; but it is believed by people that if partaken with black pepper, even by habitual consumers, deleterious effects soon show themselves. Food Plants.

The evil effects of unwholesome kodra are far more severe in beasts than in man, due, no doubt, to their eating the grain, husk and all, and also to the absence of vomiting, an effect that almost always takes place in man. It proves fatal in quantities of about two and a half ounces to such large quadrupeds as horses, cows, &c., (more so to the former), and has also been known to kill buffaloes, goats, and asses. The active principle that produces these fearful effects has not, as far as I am aware, been yet isolated.

Natives have various antidotes for kodra poisoning. The most usual ones are gruel made of the flour of *urid (Phaseolus radiatus)*, the expressed juice of the stem of the plantain which is rich in tannin and the alkaline salts; the astringent juice of the leaves of *Psidium guayara*, or the leaves of *Nyctanthes arbor tristis*. Whey has already been mentioned before. It is used in Daman and the neighbouring villages.

DILLENIACEÆ.

Dillenia Indica, Brand. For. Fl. 1.—*D. speciosa,* Dalz. & Gibs. Bby. Fl. 2. *Motha-karmal, karmal.*

The large thickened sepals are used for the table. They taste when raw like a sour apple, and are used after being sweetened with sugar. A palatable jelly is made from them.

D. pentagyna, Dalz. & Gibs. Bby. Fl. 2. *Karmal.*

The fruit, size of a gooseberry, is eaten. The flower-buds and young fruits have a pleasant acid flavour and are eaten raw or cooked in the Central Provinces.

ANONACEÆ.

Anona reticulata, Dalz. & Gibs. Bby. Fl. Suppl. 2. *Anona,* Goa; *ram-phal* or *ram-phala,* Dec.—called *bullock's heart* from its resemblance to it.

The fruit is not so good as the custard-apple, but is accepted in the absence of the latter.

A. squamosa, Dalz. & Gibs. Bby. Fl. Suppl. 2. *Custard-apple; atta,* Goa; *sita-phal,* Dec. and Bby.

The fruit is of the size of a large apple; when well ripe, it bursts on being raised, and is decidedly of a most delicate flavour, on which account it must be protected from the ravages of birds and squirrels. The seeds, well pounded, are made into a kind of ointment in the Southern Marátha Country and Goa to destroy lice in the hair.

NYMPHACEÆ.

Nymphœa lotus, *Uplea-kamal;*
Nymphœa stellata, *Uplea-kamal;* and
Nelubium speciosum, *Paisar-kamal.* } Dalz. & Gibs. Bby. Fl. 6 and 7.

These water-lilies are found in tanks throughout the Konkan. Their flowers are of various hues. The tuberous roots and the scapes—the latter known as *bishi* in the bázárs—are much esteemed as an article of food.

The immature berries, torus and seeds are eaten raw or in curries, pickled, or ground and mixed with flour are baked into bread. The

Food Plants.

ripe berries are roasted and eaten: they are very palatable, and not a bad substitute for almonds. A syrup or confection is made from the petals, and used as a cooling drink or medicine.

PAPAVERACEÆ.

Papaver somniferum. *Afim* or *amal, afu*; *kadavi* (Maráthi name of capsule).

The plant has been cultivated in India, Turkey, Asia Minor, Egypt, China, &c., from the earliest times for the sake of the juice of its capsules, named *post* or *poss*—the inspissated juice being known as opium.

The seeds called *kas-kas*, very small, size of a millet grain, white, are eaten roasted, in curries, and made into various kinds of sweets. The oil of the seeds is sweet, and is used for culinary purposes and lamps. The seeds partially roasted and mixed with sugar and cardamoms act as a gentle purgative, useful in mild cases of dysentery in infants.

The use of opium has been known from the earliest times. In the writings of the younger Mesue, who died A.D. 1015, the syrup of poppies is recommended as a sedative in coughs and catarrhs, and in the first edition of the *Ricettario Fiorentino* published in 1498, which is the earliest pharmacopœia known, a formula for the syrup is given under the name *Siroppo di Papaveri semplici di Mesue.* In the pharmacopœia of the London College (1618) it is prescribed as *Syrupus de Meconio Mesuæ.* Long before this, however, Scribonius Largus had noticed the method of procuring opium in his Compositiones Medicamentorum (circa A.D. 40), and the drug was likewise known to Dioscorides, Pliny and Theophrastus. Coming nearer our own times, we find Pyres speaking of Egyptian and Cambay opium in his letters to D. Manuel, King of Portugal, and a little later Garcia d'Orta tells us that the opium of Cambay was collected in Malwa and was soft and yellowish. The advent of opium into India is connected with the spread of Mahomedanism, and was very probably favoured by the prohibition of wine inculcated by that religion. Barbosa is the earliest European who described opium as a product of India.

The cultivation of the poppy-plant is carried on to a large extent in India, the principal regions distinguished for the production of opium being the districts of Behár and Benares, the broad table-lands of Málwa and the slopes of the Vindhya Hills. The plant requires a rich moist soil, and is injuriously affected by heavy rains. In Behár the sowing takes place at the beginning of November, and the capsules are scarified in February, March and April. The scarification has to be repeated on different sides of the capsule at intervals of a few days, and the milky juice which flows is scraped off early on the following morning with an iron scoop, and being treated for the removal of *pasewa*, which is a dark coffee-coloured fluid which collects at the bottom of the vessel, is exposed to the action of air (never to the sun) until it acquires the proper degree of dryness. This drying operation, which still leaves behind about 30 per cent. of moisture, occupies between three and four weeks, and the opium is now ready for sale at the Government factory.

It is difficult to ascertain the quantity of opium produced in India, but in the official year ending 31st March 1872, 93,364 chests valued at £13,365,228 were exported from Bengal and Bombay, the net revenue from which to the Government of India was £7,657,213.

CRUCIFERÆ.

Brassica oleracea, Dalz. & Gibs. Bby. Fl. Suppl. 4. *Common cabbage, cauliflower, knol-khol* and other varieties of cabbages, all cultivated.

B. campestris, Hook. Fl. Brit. Ind. i. 156. *Salgam* (Pers.), *Swedish turnip.* Food Plants.

The roots and tops eaten as vegetable.

B. rapa, Hook. Fl. Brit. Ind. i. 156. *Salgam* (Pers.)

Used the same way as the preceding variety.

B. nigra, Hook. Fl. Brit. Ind. i. 156. *Mustard, rye, sarsun.*

The seed and the oil are used for culinary purposes.

B. napus. } Hook. Fl. Brit. Ind. i. 157. The leaves are eaten
B. juncea. } as salad.

Lepidium sativum, Dalz. & Gibs. Bby. Fl. Suppl. 4. *Common cress; hallim,* Beng. & Dec.

Young leaves eaten as salad.

Raphanus sativus, Dalz. & Gibs. Bby. Fl. Suppl. 4. *Mula* or *mulli,* the red radish of Europe, much cultivated in the rainy season. The white native radish grows at all seasons. It is much larger and less delicate than the European plant.

CAPPARIDEÆ.

Capparis aphylla, Dalz. & Gibs. Bby. Fl. 9 and 10. *Kiram* and *kirab,* Sind.; *sodada,* Arab.; *kari.*

In dry places of Gujarát, the Deccan, Southern Carnatic, &c. The unripe fruit is cooked and eaten.

C. Zeylanica, Hook. Fl. Brit. Ind. i. 174.—*C. brevispina,* Dalz. & Gibs. Bby. Fl. 9. *Wagatti* or *waganti.*

A rigid, wiry shrub with white flowers and fruit 2 in. long, globose, bright scarlet. Two lower petals of the flower become yellow changing into red brown.

Along the banks of the nálas of the Konkan and Malabár; scarce in the Western Deccan. The fruit of this plant—rather unpleasant to the taste—and that of *Melothria heterophylla gametta* are eaten on *dvadashis* which occur in the month of *Ashad.* These two kinds of fruits are invariably associated in the *bhaji* or dish made for those days.

C. spinosa, Hook. Fl. Brit. Ind. i. 173.—*C. Murrayana,* Dalz. & Gibs. Bby. Fl. 9. *Kabar,* Arab.; *kalvari,* Sind.

At Mahábaleshvar and in most nálas and rivers along the gháts, and other parts of India. The fruit is pickled in Sind. The flower-buds are the capers of Europe.

Cleome viscosa, Roxb. Fl. Ind. ii. 128.—*Polanisia icosandra,* Dalz. & Gibs. Bby. Fl. 8. *Harhuria,* Mah.; *khanphutia,* Hind.

It is a very common viscous herb 1-3 ft. high, with 3-5 foliolate leaves and small yellow flowers. It has an acrid taste somewhat resembling that of mustard, but is eaten boiled with chillies and salt as salad.

Gynandropsis pentaphylla, Dalz. & Gibs. Bby. Fl. 7. *Hul-hul.*

An annual, glandular, pubescent herb with 5-foliolate leaves and small flowers of a white or purplish colour in glutinous racemes. It has an acrid taste and a very disagreeable smell, but is used in chutnies and curries.

Food Plants.

BIXINEÆ.

Flacourtia Ramontchi. *Tumbat. Panáwla*, Beng.; *swaadoo kantaka*, Sans.; *tambat.*

The fruit dark-red or black, about ½ in. long, is eaten.

F. cataphracta. *Jaggam.*

This tree bears a fruit size of a small plum, of a purplish colour, and tastes somewhat like that of *Adam's fruit (Mimusops kanki)*. A curious plan by which the fruit is rendered more palatable, is to slightly squeeze it between the thumb and the forefinger for a minute or two, and then roll it gently between the palms of the hands, by which the fruit becomes softer and loses its original asperity.

F. montana. *Attak-ke-jar.*

The fruit, size of a cherry, slightly acid, eaten.

F. inermis. *Tambat*, and also called *jaggam.*

Cultivated. The fruit, about the size of a cherry, red and acid, is eaten. It resembles the fruit of *F. cataphracta*, but is inferior.

F. sepiaria. *Atrun.*

High ranges. The fruit, size of a large pea, is eaten. This plant differs from the last in being smaller and thorny.

F. sapida. *Bàurhi* (this name is also given to *Psoralea*), Konkan. The fruit is eaten.

PORTULACEÆ.

Portulaca oleracea. *Gôl* (this name is also given to *Sponia Wightii*).

A very common weed. It is slightly acid, but much esteemed as a pot-herb.

P. quadrifida. *Kota; chaval-ke-bhaji.*

Also a common weed. Eaten as a pot-herb.

GUTTIFERÆ.

Garcinia Indica, Hook. Fl. Brit. Ind. i. 261.—*G. purpurea*, Dalz. & Gibs. Bby. Fl. 31. *Kokam*, Mah.; *brindão*, Goa.

The ripe fruit eaten, and the dried rind used as a garnish to give an acid flavour to curries. From the fresh rind of the ripe fruit a syrup is prepared for use during the hot months.

G. xanthochymus, Hook. Fl. Brit. Ind. i. 269.—*Xanthochymus pictorius*, Dalz. & Gibs. Bby. Fl. 31. *Dampel, tumal.*

The fruit temptingly beautiful, as big as an orange, smooth and bright yellow; strongly acid, more so in the fleshy rind. The pulp, which is less acid, if eaten puts the teeth out of order for a couple of days. It is only eaten by poor natives and flying-foxes.

G. mangostana, Dalz. & Gibs. Bby. Fl. Suppl. 14. *Mangustin.*

It was introduced many years ago, but has disappeared. At the desire of Mr. Robertson, Revenue Commissioner, Central Division, experiments are being tried in Poona and elsewhere to re-introduce it. The fruit is occasionally seen, in the Bombay market, but is not so palatable as that collected in its native place.

G. cambogia, Hook. Fl. of Brit. Ind. i. 261. The acid rind of ripe fruit is eaten, and in Ceylon it is dried like the *kokam*, and eaten as a condiment in curries. Food Plants.

MALVACEÆ.

Hibiscus esculentus, De Cand. Prod. i. 450.—*Abelmoschus esculentus*, Dalz. & Gibs. Bby. Fl. Suppl. 7. *Bhenda* or *bhendi*.

One of the vegetables the most widely cultivated in India for the sake of its excellent capsule.

H. cannabinus, Dalz. & Gibs. Bby. Fl. 20. *Ambari*.

Much cultivated on account of the flax which its bark yields. Tender shoots and leaves eaten as pot-herb.

H. subdariffa, Dalz. & Gibs. Bby. Fl Suppl. 7. *Mesta*, Beng.; *rozelle*.

The succulent sepals yield a delicious jelly, a good substitute for the red currant jelly; puddings and tarts are also made of them. There are two kinds, the red and the white, the latter a little less acid.

Bombax Malabaricum, D. C. Prod. i. 479.—*Salmalia Malabarica*, Dalz. & Gibs. Bby. Fl. 22. *Saur* or *siwur*, Mah.; *mochras*, Hind.

The calyx and flower-buds eaten as a vegetable.

Adansonia digitata, Dalz. & Gibs. Bby. Fl. Suppl. 9. *Baobab*, *gorak-chinch*, *goruchi ambli*, *chauri*.

The fruit is about the size of an ostrich's egg. From the pulp of the fruit an agreeable acid sherbet is made, and the leaves dried and powdered are mixed with food as condiment.

TILIACEÆ.

Grewia Asiatica, Dalz. & Gibs. Bby. Fl. 26. *Phalsi*, *phalsa*, *dhamin*.

Wild and cultivated throughout India for the sake of its dark-brown, small, pleasantly acid fruit, which is eaten. A sherbet made from it is liked by some.

G. microcos, Dalz. & Gibs. Bby. Fl. 26. *Shiral*, *ansalé*.

Common in the hilly parts of the Konkan and elsewhere in India. The drupe, size of a pea, purplish when ripe, sweet, is eaten.

G. polygama, Dalz. & Gibs. Bby. Fl. 26. *Gowli* or *gowali*.

Common in the Konkan. The drupe, ½ in. diam., hairy, brownish, and sweet, is eaten.

G. tiliæfolia, Dalz. & Gibs. Bby. Fl. 26. *Daman*.

The drupe blackish, size of a small pea, eaten.

G. villosa, Dalz. & Gibs. Bby. Fl. 25.

Western and Southern India. The fruit globose, size of a cherry, eaten.

G. pilosa, Dalz. & Gibs. Bby. Fl. 26.

In the Deccan. The drupe reddish brown, size of a large pea, eaten.

Food Plants.

GERANIACEÆ.

Oxalis corniculata, Roxb. Fl. Ind. ii. 457; Dalz. & Gibs. Bby. Fl. 42. *Amrul*, Hind. & Beng.; *ambuti*, Dec.

The leaves eaten as salad. Several other acid herbs and shrubs are named *ambuti.*

Averhoa bilimbi, Dalz. & Gibs. Bby. Fl. Suppl. 16. *Bilimb*, Bomb.; *kamaranga*, Hind.

Cultivated. The fruit has a small translucent rind. It is as soft as butter when ripe; unfit to be eaten (except when cooked in curries or pickled) on account of its acidity. It is made into a good compote. The fruit hangs in a singular way from the branches, being suspended in clusters of 8 or 10 by slight thread-like stalks.

A. carambola, Dalz. & Gibs. Bby. Fl. Suppl. 16. *Carambol*, Bomb.; *karmar.*

Cultivated. Fine, semi-transparent, amber-coloured fruit, as big as a lemon. It possesses an agreeable scent and flavour when ripe, though hardly eatable, because of its acidity. A good jelly is made of the pulp. The fruit pickled, or used in curries.

RUTACEÆ.

Toddalia aculeata, Dalz. & Gibs. Bby. Fl. 46.

A thorny shrub with trifoliate leaves and small white flowers in axillary cymes. Fruit, size of a small cherry, has a strong pungent taste like black-pepper; is used in curries as a substitute for spices. Leaves boiled and used as green in famine times. The root-bark, bitter, pungent and aromatic, is officinal in the Indian Pharmacopœia and is employed in the form of tincture as an aromatic tonic and stimulant. The natives use it also in jungle fevers. Formerly it was much used in diarrhœa, and was known in Europe as Lopes' root.

Ægle marmelos, Dalz. & Gibs. Bby. Fl 31. *Bel, bel-phal.*

The fruit varies much in size, the smallest being about the best. It is covered by a hard shell, and contains a yellow consistent substance agreeable to the taste and smell.

Feronia elephantum, Dalz. & Gibs. Bby. Fl. 30. *The elephant* or *wood-apple; kaota*, Mah. *kavit.*

Round, pale-green or scurfy fruit, as big as an orange, containing a rather acrid and not much palatable substance. The pulp makes a pretty good jelly.

Citrus aurantium, Dalz. & Gibs. Bby. Fl. Suppl 12. *Sweet orange, naranghi çantra.*

Grows everywhere in India. There are several varieties; that from Nágpur *(çantra)* being well known.

C. decumana, Dalz. & Gibs. Bby. Fl. Suppl 12. *Pomelo, shaddock, papanass.*

Commonly cultivated in India. The pomelo has been raised to perfection in Bombay. It is more scarce in the north of India. The fruit is pulpy and full of juice; gathering it too soon tells, as a rule, on its flavour.

C. limetta, Dalz. & Gibs. Bby. Fl. Suppl 18. *Sweet lime, mittá limbu.* **Food Plants.**

Cultivated. The fruit is as large as an ordinary orange, with smooth rind, inferior in taste to the latter.

C. medica, Dalz. & Gibs. Bby. Fl. Suppl 13. *Citron, limu.*

Cultivated. Well known for its thick rind, which makes good preserve. The pulp is also preserved in sugar. Both fruit and preserve are somewhat bitter to the taste.

Glycosmis pentaphylla, Dalz. & Gibs. Bby. Fl. 29. *Kirmira*, Bomb.; *menki*, Goa.

Common in the jungly parts of the Konkan. The fruit is eaten.

Murraya Kœnigii, Hook. Fl. Ind. i. 503.—*Bergera Kœnigii*, Dalz. & Gibs. Bby. Fl. 29. *Bursunga*, Hind.; *karri-nim, karria pat.*

Common on the Konkan ghâts and other parts of India. The leaves used as garnish in curries and chutnies.

Triphasia trifoliata, Dalz. & Gibs. Bby. Fl. Suppl 12. *Chini naranghi.*

Found in the Konkan, but said to be an escape from cultivation. Common in gardens throughout India, indigenous in China. The fruit used in conserve, and pickled.

BURSERACEÆ.

Garuga pinnata, Dalz. & Gibs. Bby. Fl. 313. *Kurak, kakur*, Bomb. The drupe size of a gooseberry, eaten raw or pickled.

OLACINEÆ.

Ximenia Americana, Roxb. Fl. Ind. ii. 252; W. & Arn. Prod. i. 89.

A shrub or small tree with a red astringent bark. Grows in tropical Africa, America, and almost all over India, Ceylon, Malacca, Andaman Islands and Malayan Archipelago. In this Presidency it is described from Belgaum. Drupe ovoid with one solid stone, edible when ripe. The wood is used as a substitute for sandal-wood. This plant is not mentioned in Dalz. & Gibs. Bby. Flora.

RHAMNEÆ.

Zyzyphus jujuba, Dalz. & Gibs. Bby. Fl. 49. *Bhor.*

The fruit is small, round, and of a yellowish colour. There are several kinds of it, varying in size and flavour; those from Ahmedabad being much prized on this side of India. The unripe fruit is pickled. The bony stone is cracked, and the kernel, which is palatable, eaten. It is much procured in times of scarcity.

Z. rugosa, Dalz. & Gibs. Bby. Fl. 49. *Turan.*

Common. The edible fruit is a great support to the people of the ghâts from March to the middle of May.

Food Plants.

AMPELIDEÆ.

Vitis vinifera, Dalz. & Gibs. Bby. Fl. Suppl. 15. Common *grape; dakh* or *drakh*, Hind.; *angur*, Pers.

Cultivated in several parts of India. There are numerous varieties of the grape; that of Aurungabad ranks among the best. The fruit from Cabul, also of superior quality, appears in the bázárs in small, flat, circular, wooden boxes.

Leea macrophylla, Dalz. & Gibs. Bby. Fl. 41. *Dinda.*

On the hills of the Konkan pretty common. Tender leaves eaten as vegetable.

SAPINDACEÆ.

Nephelium litchi, Dalz. & Gibs. Bby. Fl. Suppl. 13. *Lichi.*

Cultivated; indigenous in China. The fruit, the size of a plum, contains a fleshy, whitish aril or pulp, as delicious as that of any other fruit and a single stone in the centre. The quality of the fruit varies according to the size of the stone, the smallest being found in the best.

N. longanum, Dalz. & Gibs. Bby. Fl. 35. *Wumb-ashphal.*

Konkan and elsewhere. The fruit, reddish or purple, is not so palatable as that of the preceding, though resembling it. It is of the size of a small marble, and borne in bunches.

Schleichera trijuga, Dalz. & Gibs. Bby Fl. 35. *Kossimb* or *koshim.*

Rám Ghát and elsewhere. The fruit about 1 in. long, smooth or spinous. The subacid pulp eaten.

Allophylus Cobbe, Hook. Bby. Fl. i. 673. *Tipin, mendri.*

A straggling shrub with ternate leaves, small, yellow or white flowers and red, shining, globose fruits. Common all over India and from the Konkan southwards. The ripe fruit is eaten.

ANACARDIACEÆ.

Anacardium occidentale, Dalz. & Gibs. Bby. Fl. Suppl. 18. *Cashew nut, caju.*

Common in the Konkan. The kidney-shaped kernel eaten both raw and roasted; also the fleshy peduncle.

Mangifera Indica, Dalz. & Gibs. Bby. Fl. 51. *Mango, amba.*

This well-known fruit varies in size from a betel-nut to a pomelo. The various kinds found in Bombay and Goa are known under different names,—the *Alphonso, Fernandina* and *Pairi* ranking among the foremost, and yielding in flavour to no other known fruit. The unripe fruit is pickled in salt and water or in vinegar, with or without chillies, mustard, etc. It is also cut into slices, dried in the sun, and used like kokam to flavour curries. The slices are called *solam.*

Buchanania latifolia, Dalz. & Gibs. Bby. Fl. 52. *Payal, charoli.*

The kernel is generally substituted for almonds, and is eaten roasted with milk. It is also largely used in native confectionery.

Nothopegia Colebrookiana, Hook. Fl. Ind. ii. 40.—*Glycarpus racemosus,* Dalz. & Gibs. Bby. Fl. 51. *Amberee.* Food Plants.

Grows on the ghâts. The drupe ¼ in. diam. with the top depressed, red when ripe. The sweet pulp eaten.

Semecarpus anacardium, Dalz. & Gibs. Bby. Fl. 52. *Marking-nut; bhiba,* Bomb.

Kernel of the drupe eaten as nut.

Spondias mangifera, Dalz. & Gibs. Bby. Fl. Suppl. 19. *Hog's plum, ambara, amra.*

The largest fruit is as big as a goose's egg. The part near the stone sweet; that nearest the rind being acid, not nearly so good in taste or smell as the mango. The acid leaves used as vegetable or in curries.

MORINGACEÆ.

Moringa pterygosperma, Dalz. & Gibs. Bby. Fl. 311. *Segata sanga; moosing,* Goa.

Wild and cultivated throughout India. Leaf, flower, and pod prepared with various condiments used as vegetable, and the pungent root as garnish instead of mustard.

M. Concanensis, Dalz. & Gibs. Bby. Fl. 311.

Southern Konkan. The unripe fruit eaten as vegetable.

LEGUMINOSÆ.

Trigonella fœnum-græcum, Dalz. & Gibs. Bby. Fl. Suppl. 21. *Methi.*

Herb eaten as vegetable and as a garnish in curries.

Cyamopsis psoraloides, Dalz. & Gibs. Fl. Suppl. 21. *Gauri, mutki.*

Cultivated for the sake of its pods, which are delicate and are eaten as vegetable like French beans and put in curries, *shak-bhaji,* etc. Cattle are also fond of the plant.

Sesbania grandiflora, Bedd. Fl. Sylv. 86.—*Agati grandiflora;* Dalz. & Gibs. Bby. Fl. Suppl. 22. *Augusta,* Beng.

Leaves, flowers and young pods eaten as vegetable in all seasons. When freely taken they cause diarrhœa.

Smithia sensitiva, Dalz. & Gibs. Bby. Fl. 63. *Kaola.*

This herb is specially used, made into *bhāji* with various condiments on every Monday of the month of *Shrávan.*

Arachis hypogea, Dalz. & Gibs. Bby. Fl. Suppl. 27. *Bhuymung, chini-badham, mung phuli, earth* or *ground-nut.*

The legumes contain two or three irregular-formed beans of nut-like flavour somewhat resembling the pestachio, but rather inferior. They are eaten raw, but are much better for being roasted.

Pueraria tuberosa, Dalz. & Gibs. Bby. Fl. 67. *Dari?*

Root large, tuberous, stem twining, shrubby with large trifoliate leaves and beautiful blue flowers. The root is eaten. Poultices made of the pounded tuber are applied to reduce swellings of the joints.

Food Plants.

Cicer arietinum, Roxb. Fl. Ind. iii. 324; Dalz. & Gibs. Bby. Fl. Suppl. 22. *Chenna-hurbara, gram.*

It is extensively cultivated all over India.

Vicia hirsuta, Hook. Fl. of Brit. Ind. ii. 177.—*Ervum lens,* Dalz. & Gibs. Bby. Fl. Suppl. 22. *Lentil, massur.*

Much cultivated for the sake of its seeds, which are red, and is highly esteemed by the natives. It is said that they enter into the composition of *Revalenta Arabica.*

Lathyrus sativus, Roxb. Fl. Ind. iii. 321; Dalz. & Gibs. Bby. Fl. Suppl. 22. *Lang,* Gujarát; *kesari, theori,* Beng.

Cultivated and wild. The dhall of the seeds is used by very poor people, but causes paralysis when used in large quantity.

Pisum sativum, Roxb. Fl. Ind. iii. 321; Dalz. & Gibs. Bby. Fl. Suppl. 22. *Common pea.*

Cultivated in Bombay, Konkan and Gujarát during the cold season and in the Deccan in the rains.

Canavalia ensiformis, D. C. Prod. ii. 404. *Gaivara.*

Stem rather twining, perennial or biennial, wild and cultivated everywhere throughout India and in the tropics. Several varieties are described :—

(1st.) *C. virosa,* Dalz. & Gibs. Bby. Fl. 69. This is perhaps the wild form of the plant rather than a variety; the pods of this are bitter.

(2nd.) *C. turgida* of Wallich or *C. Stocksii* of Dalz. & Gibs. Bby. Fl. The pods of this are larger and more turgid; and

(3rd.) *C. mollis.* Pods smaller, those of the cultivated variety are sweet. The tender pods are eaten like French-beans.

Phaseolus lunatus, Roxb. Fl. Ind. iii. 287.

Cultivated everywhere for the sake of the legumes which are known as French-beans. There are several varieties.

Ph. vulgaris, Roxb. Fl. Ind. iii. 287; Dalz. & Gibs. Bby. Fl. Suppl. 22.

Everywhere cultivated for the sake of its seeds. This is a variety of the last.

Ph. adenanthus, Hook. Fl. of Brit. Ind. ii. 200.—*Ph. rostratus,* Dalz. & Gibs. Bby. Fl. Suppl. 23. *Hullounda, hullowla ?*

Said to be cultivated. The tuberous roots are cooked and eaten.

Ph. trilobus, Roxb. Fl. Ind. iii. 298; Dalz. & Gibs. Bby. Fl. 71. *Arkmut.*

Wild and cultivated for the sake of the pods.

Ph. aconitifolius, Roxb. Fl. Ind. iii. 299; Dalz. & Gibs. Bby. Fl. Suppl. 23. *Mat.*

Commonly cultivated with bájri, good for horses. The leaves are eaten as vegetable.

Ph. mungo, Roxb. Fl. Ind. iii. 292; Dalz. & Gils. Bby. Fl. Suppl. 23. *Urid* (with green seeds), *mung* (yellow seeds).

Cultivated extensively. Its *dhal* is highly esteemed by people

Food Plants.

It presents several varieties :—*Ph. glaber; Ph. Wightianus; Ph. radiatus; Ph. Roxburghii; Ph. setulosus.* Botanically the plants yielding *urid* and *mung* are the same. They are most useful to the people of this country.

Vigna catiang, Hook. Fl. Brit. Ind. ii. 205.—*Dolichos sinensis,* Dalz. & Gibs. Bby. Fl. Suppl. 23. *Chowli, safed lobeh, kurrea lobeh, gat-val.*

An annual, sub-erect or twining shrub with membranous leaflets and yellow or reddish flowers. Pod in cultivated plant 1-2 ft. long. Seeds, 10-20 in each pod, are much used, especially by Pársis, who even import them from China.

Dolichos lablab, Roxb. Fl. Ind. iii. 305.—*Lablab vulgaris,* Dalz. & Gibs. Bby. Fl. Suppl. 23. *Pauti, valpapri.*

A perennial or under cultivation annual, wide-twining herb with trifoliate leaves with white or reddish flowers, and pod about 2 in. long. It is extensively cultivated all over India, specially during the cold season, on the sloping lands along the banks of rivers. The seeds are much relished; they are boiled and eaten.

D. biflorus, Roxb. Fl. Ind. iii. 313.—*D. uniflorus,* Dalz. & Gibs. Bby. Fl. Suppl. 23. *Kulti.*

An annual twining (former) or sub-erect (latter) plant with trifoliate leaves, yellow flowers, and pod much recurved about 2 in. long, 5-6 seeded. Commonly cultivated, chiefly as food for cattle.

Psophocarpus tetragonolobus, D. C. Prod. ii. 403; Dalz. & Gibs. Bby. Fl. Suppl. 23. *Chowdari, chevaux-de-frize* of the French.

A twining herb with large root, blue flowers, and pod about one foot long, square, with a distinct fringed wing to each angle. It is cultivated throughout Bombay and India.

Atylosia lineata, W. & A. Prod. 258.—*A. Lawii,* Dalz. & Gibs. Bby. Fl. 74. *Jungli-tur.*

An erect, annual herb with trifoliate leaves and small 2-3-seeded oblong pods. The seeds are eaten by the poor people, specially during seasons of scarcity.

Cajanus Indicus, Dalz. & Gibs. Bby Fl. Suppl. 24. *Tur.*

Cultivated throughout India for the sake of its seeds, which are much used by the people of this country. The *dhal* of this is highly nutritious, and is much prized.

Cassia tora, Dalz. & Gibs. Bby. Fl. 81. *Tacla.*

The tender leaves of this common weed are boiled and eaten as pot-herb. The seeds are said to be a good substitute for coffee.

C. sophora, Dalz. & Gibs. Bby. Fl. 81.

A common weed. Its leaves are, as those of the last species, eaten as vegetable. The heavy disagreeable smell is removed by boiling.

Tamarindus Indicus, Dalz. & Gibs. Bby. Fl. 82. *Chinch, ambli.*

The seedling or tender plant about a foot high together with the cotyledons are eaten as vegetable. The flowers made into a dish.

Food Plants.

called *chingar* are also eaten, as also the pulp of the fruit. The seeds are also eaten roasted in ordinary seasons as well as in times of scarcity.

Ceratonia siliqua, Dalz. & Gibs. Bby. Fl. Suppl. 28. *Carob tree* or *algaroba* of the Spaniards.

Indigenous in Spain, Algeria and Syria. Its pods full of sweet nutritious pulp are a common article of food for man, horses, pigs and cattle in those countries. The plant has been lately introduced into India, but it is of slow growth.

Bauhinia Vahlii, Dalz. & Gibs. Bby. Fl. 83. *Chamboli.*

The large seeds eaten when ripe, taste like cashew nuts.

B. Malabarica, Dalz. & Gibs. Bby. Fl. 82. *Amlee, koral.*

The acid leaves eaten as vegetable and the flower buds pickled.

B. purpurea, Dalz. & Gibs. Bby. Fl. Suppl. 30. *Karvallika.*

Cultivated. The flower-buds pickled and eaten as vegetable.

B. variegata, Dalz. & Gibs. Bby. Fl. Suppl. 30. *Karal.*

The flower-buds are pickled.

Entada scandens, Brand. For. Fl. 167.—*E. pusætha*, Dalz. & Gibs. Bby. Fl. 83. *Gardal, garbi.*

An immense climber. Leaves bipinnate, the rachis usually ending in a tendril. Pod 1-2 ft. long, constricted between the seeds. These, which are about 2 in. broad, are eaten boiled or roasted.

Adenanthera pavonina, Dalz. & Gibs. Bby. Fl. Suppl. 26. *Thorla gunj.*

A large timber tree. Leaves large, bipinnate. Flowers yellow. Pod 6-9 in. long, falcate, 10-12-seeded, seeds flat, scarlet. These are eaten raw or roasted; they are also used as weights, and are worn as necklaces.

Prosopis spicigera, Dalz. & Gibs. Bby. Fl. 84. *Sumri, shemi.*

The sweetish pulp surrounding the seeds eaten in Gujarát and in the Deccan.

Acacia concinna, Dalz. & Gibs. Bby. Fl. 87. *Sikakai.*

A large, common, prickly climber. The leaves are acid, and are used in curries instead of tamarind. (*See* Vegetable Soaps.)

Pithecolobium dulce, Bedd. Fl. Sylv. Tab. 188.—*Inga dulcis*, Dalz. & Gibs. Bby. Fl. Suppl. 25. *Bilaiti ambli.*

The fruit eaten at Manilla.

ROSACEÆ.

Parinarium excelsum, Dalz. & Gibs. Bby. Fl. Suppl. 32. *Guinea-plum.* Naturalized in Goa, where it is called *matomba.*

The fruit eaten.

Prunus amygdalus, Brand. For. Fl. 190.—*Amygdalus communis*, Dalz. & Gibs. Bby. Fl. Suppl. 32. *Almond, badam.*

Introduced in gardens, but does not flourish in Bombay; most successfully cultivated in Afghanistán, Cashmere, Persia and in the plains of the Punjáb and other cooler parts of India.

P. Persica, Brand. For. Fl. 191; Dalz. & Gibs. Bby. Fl. Suppl. 32. *Amygdalus Persica, peach tree, aru* (Pers.) Food Plants.

Cultivated successfully in cooler parts of India, Deccan, Mahábaleshvar, Punjáb, Sikkim, etc. "Flourishes well at Belgaum, Dhárwár, Ahmednagar, etc. The air of the Konkans does not suit it".—Bby. Fl. It is said that the peach cultivated in the North-West Provinces is a very sweet, mellow fruit; that of Pánchgani is not good.

The nectarine is a variety with glabrous smooth fruit, and the peach with downy pericarp.

Rubus lasiocarpus, Dalz. & Gibs. Bby. Fl. 89. *Raspberry.*

Common on the hills of India ascending up to 8000 ft. It is cultivated also at Mahábaleshvar. The authors of Bombay Flora say that "common raspberry of England (*R. Idæus*) has been successfully cultivated at Phondá Ghát, south of Kolhápur. It probably would not succeed further inland."

Fragaria vesca, Hook. Fl. Brit. Ind. ii. 344. *Strawberry.*

This species is cultivated at Mahábaleshvar and various parts of India. The authors of Bombay Flora state that "the species *F. elatior* is successfully cultivated in gardens above the ghâts, and extensively by natives near Poona for sale in camp. The strawberries of Kolhápur and its vicinity appear to be the best."

Eribotra Japonica, Dalz. & Gibs. Bby. Fl. Suppl. 32. *Loquat.*

This is a Chinese fruit-tree. Belgaum is the only place where it flourishes and yields fruit of good flavour.

Pyrus Malus, Dalz. & Gibs. Bby. Fl. Suppl. 32. *Apple-tree.*

Cultivated in the Deccan, Mahábaleshvar and various other parts of India; but the fruit is small, and not of good flavour.

COMBRATACEÆ.

Terminalia bellerica, Dalz. & Gibs. Bby. Fl. 91. *Bherda.*

The kernel eaten as nut. It acts as a poison when eaten in large quantity.

T. chebula, Dalz. & Gibs. Bby. Fl. 91. *Hirda.*

The kernel eaten as nut.

T. catappa, Dalz. & Gibs. Bby. Fl. Suppl. 33. *Bengali badham, desi-badham.*

The nut has a most delicious flavour. The small white kernel when extracted is steeped in a plate containing water for a short time before it is eaten.

MYRTACEÆ.

Eugenia Malaccensis, Dalz. & Gibs. Bby. Fl. Suppl. 35. *Malacca jám, Malacca amrul.*

Cultivated. The fruit is as big as an ordinary apple, which it also resembles in form; smooth, white, and slightly crimson. It is not much prized as a fruit.

Food Plants.

E. jambos, Hook. Fl. Ind. ii. 474—*Jambosa vulgaris,* Dalz. & Gibs. Bby. Fl. Suppl. 35. *Rose-apple, gulab-jam.*

Cultivated on this side. The fruit is of the size of an apple, very handsome, yellowish, with a tinge of red; rather poor in taste, and therefore scarcely eaten.

E. jambolana, Hook. Fl. Ind. ii. 499.—*Syzygium jambolanum.*—Dalz. & Gibs. Bby. Fl. 93. *Jambul.*

The fruit, which is common in India, is about as big as Adam's fruit (*Mimusops kanki*), of a beautiful dark-purple colour and succulent, though not of a very good flavour. It has a single stone. Good wine is made from it at Goa.

E. caryophyllæa, Hook. Fl. Ind. ii. 490.—*Syzygium caryophyllæum,* Dalz. & Gibs. Bby. Fl. 93.

This plant grows in Southern Konkan, and always on the banks of the streams. The berry globose, size of a large pea, eaten.

Psidium guayava or **pyriferum,** Dalz. & Gibs. Bby. Fl. Suppl. 34. *Guava, jám* (Dec.), *peru* (Bomb.)

The fruit, size of a lemon, sometimes larger, generally smooth and pale-yellow outside, white or red inside. It possesses a delicious flavour and strong scent, and requires to be protected whilst on the tree from being devoured by bats and squirrels. It affords an excellent preserve. There are several varieties.

Caryophyllus aromaticus, Dalz. & Gibs. Bby. Fl. Suppl. 34. *Clove-tree, lawang.*

Cultivated in Bombay. The part used as condiment is the unexpanded dried flower-bud. The Americans have introduced into commerce an imitation: dealwood cut into appropriate pieces are soaked into a solution of true cloves. Cinnamon is also imitated in the same way.

MELASTOMACEÆ.

Melastoma malabathricum, Dalz. & Gibs. Bby. Fl. 92.

Common in the Konkan. The fruit is short-ovoid, truncate. The pulp eaten.

Memecylon edule, Dalz. & Gibs. Bby. Fl. 93. *Anjan, karpa.*

Common in the hilly parts of the Konkan and elsewhere. The berry ¼ in. diam., dark-purple, globose. The pulp eaten.

LYTHRARIEÆ.

Punica granatum, Dalz. & Gibs. Bby. Fl. Suppl. 34. *Pomegranate, dhalim, anar.*

Common. There are several varieties in India, the best being that from Cabul. The Patna variety is also much esteemed. The fruit eaten.

ONAGRARIEÆ.

Trapa bispinosa, Dalz. & Gibs. Bby. Fl. 99. *Water-chestnut, shingara.*

Found in Asia and tropical Africa; common in tanks in the Konkan and Gujarát. Very extensively cultivated in Cashmore, and the Cashmere authorities admit it that for five months, during the late famine, 3,000 human beings lived on the nut of this plant, and that an annual revenue of £100,000, or ten lákhs of rupees, was derived therefrom. Food Plants

Colonel Sleeman in his "Rambles" gives the following account of this plant in the North-West Provinces:—

"Here, as in most other parts of India, the tanks get spoiled by the water-chestnut (shingara) which is everywhere as regularly planted and cultivated in fields under a large surface of water as wheat or barley is on the dry plains. It is cultivated by a class of men called Dheemurs, who are everywhere fishermen and palankeen-bearers; and they keep boats for the planting, weeding and gathering the shingara. The holdings or tenements of each cultivator are marked out carefully on the surface of the water by long bamboos stuck up in it; and they pay so much the acre for the portion they till. The long straws of the plants reach up to the surface of the water, upon which float their green leaves; and their pure white flowers expand beautifully among them in the latter part of the afternoon. The nut grows under the water after the flowers decay, and is of a triangular shape and covered with a tough brown integument adhering strongly to the kernel, which is white, esculent, and of a fine cartilagenous texture. The people are very fond of these nuts, and they are carried often upon bullocks' backs 2 or 3 hundred miles to market. They ripen in the latter end of the rains or in September, and are eatable till the end of November. The rent paid for an ordinary tank by the cultivator is about 100 rupees a year. I have known 200 rupees to be paid for a very large one, and even 300, or 30 pounds a year. But the mud increases so rapidly from this cultivation that it soon destroys all reservoirs in which it is permitted; and where it is thought desirable to keep up the tank for the sake of the water, it should be carefully prohibited."

PASSIFLORACEÆ.

Carica papaya, Dalz. & Gibs. Bby. Fl. Suppl. 37. *Pappai.*

The fruit, which is as big as an ordinary cocoanut, is pale-yellow when ripe, presenting the tempting appearance of a ripe mango when cut open. It has a sweetish taste, and makes an excellent tart. It resembles the apple in taste, and is substituted for the sauce of the latter fruit. It has the property of making meat hung on the branches of the tree, tender; the green fruit is also mixed with meat when set to boil for the same purpose, and also cut into slices and eaten as vegetable. It is also pickled.

Passiflora quadrangularis, Dalz. & Gibs. Bby. Fl. Suppl. 38. *Square-stalked passion-flower; common granadilla.*

Cultivated. The fruit size of a skinned cocoanut, much prized in the hot weather for its sweetness and slight acidity, which renders it very agreeable. There are several varieties of it.

CUCURBITACEÆ.

Trichosanthes anguina, Dalz. & Gibs. Bby. Fl. Suppl. 37. *Common snake gourd, parwar, padavala, patola* (Sans.)

The long curiously twisted fruit, eaten as vegetable.

Food Plants.

T. cucumerina, Dalz. & Gibs. Bby. Fl. 102. *Jangli-padavala, kadu-padavala, pudoli.*

Stem annual, twining. Common throughout India, Ceylon, Malaya and South Australia. Very common in hedges in Gujarát and Konkan. The unripe fruit, about 2-4 in. long, ovate, is bitter, but after being boiled is eaten in curries. The seeds are said to be anti-febrile; the whole plant is bitter, and is used in moderate doses as anti-periodic and for promoting digestion. In larger doses it acts as purgative and emetic.

Lagenaria vulgaris, Dalz. & Gibs. Bby. Fl. Suppl. 36. *Harrea-kuddu* (Dec.), *tumbi, bobora branca* of the Portuguese.

Supposed to be a native of India and tropical Africa, but now cultivated throughout the tropics. The fruit oblong, about 1 ft. long, broader towards the top, is at first greenish, then whitish-yellowish. The rind becomes hard by age. The soft meal is eaten cooked in various ways. In the wild state the fruit, specially the rind, is poisonous. (*See* Poisons.)

Momordica charantia, Dalz. & Gibs. Bby. Fl. 102. *Karela, karati.*

The fruit is oblong-ovate, about 1-3 in. long, very bitter, but extensively eaten after being boiled and variously cooked.

M. Dioica, Dalz. & Gibs. Bby. Fl. 102. *Karatola* or *vantha-karatola.*

The ovate muricated fruit eaten variously cooked.

M. balsamina, D. C. Prod. iii. 311. *Karelo-jangro,* Sind.

Grows in Sind, North-West Provinces, Punjáb, Australia, Africa, etc. Fruit 1-3 in. long, rostrate, orange-red, eaten as vegetable. This is a variety of the last, but described here, as a distinct species, in deference to the opinion of some of the Indian botanists.

Luffa acutangula, Dalz. & Gibs. Bby. Fl. Suppl. 36. *Gonsali. turai, jinga.*

Cultivated in India, Africa and America. Said to be a native of India. Fruit about 6-10 in. long, is marked with 10 prominent and acute ridges. It is eaten as vegetable.

Luffa amara is the parent of this plant.

Luffa cylindrica, Naud. Ann. Sc. Nat.—*L. Ægyptiaca,* D. C. Prod. iii. 303.—*L. pentandra,* Dalz. & Gibs. Bby. Fl. Suppl. 36. *Parula, turi, gonsali.*

Indigenous in the tropics of the Old World. Cultivated also in America. The fruit, size of that of the last, but smooth, marked by 10 dark-green, longitudinal lines, not raised. It is eaten as a vegetable.

Cucumis melo, Dalz. & Gibs. Bby. Fl. Suppl. 36. *Melon, karbuj.*

The fruit is odorous, varies in size and taste, highly delicious when carefully raised, and commands a good price. The plant is cultivated in several parts of India along the banks of rivers. *C. utilissimus,* Roxb.; *C. momordica, C. agrestis,* Nand.; *C. culta,* Kur.; *C. maderaspatanus, C. turbonatus,* are all varieties of the same plant. *C. pubescens,* Dalz. & Gibs. Bby. Fl. 103; and *C. cicatrisatus* described

by Dr. Stocks (a variety of the last) are said to be parents of the cultivated species:— Food Plants

"This appears to me to be far the most useful species of *cucumis* that I know; when little more than one-half grown, they are oblong and a little downy; in this state they are pickled; when ripe they are about as large as an ostrich's egg, smooth and yellow; when cut they have much the flavour of the melon, and will keep good for several months, if carefully gathered without being bruised and hung up; they are also in this stage eaten raw, and much used in curries by the natives.

"The seeds, like those of the other *cucurbitaceous* fruits, contain much farinaceous matter blended with a large portion of mild oil; the natives dry and grind them into a meal, which they employ as an article of diet; they also express a mild oil from them, which they use in food and to burn in their lamps. Experience as well as analogy prove these seeds to be highly nourishing and well deserving of a more extensive culture than is bestowed on them at present.

"The powder of the toasted seeds mixed with sugar is said to be a powerful diuretic, and serviceable in promoting the passage of sand and gravel.

"As far as my observation and information goes, this agriculture is chiefly confined to the Guntoor Circar, where these seeds form a considerable branch of commerce; they are mixed with those of *Holcus sorghum* or some other of the large culmiferous tribe and sown together; these plants run on the surface of the earth, and help to shade them from the sun, so that they mutually help each other.

"The fruit I observed above keeps well for several months if carefully gathered and suspended. This circumstance will render them a very excellent article to carry to sea during long voyages."—Roxb. Fl. Ind. 701.

C. sativus, Dalz. & Gibs. Bby. Fl. Suppl. 36. *Common cucumber, kakri* or *kankri.*

Supposed to be a native of India; cultivated. There are numerous varieties throughout the Old and New World. The fruit is eaten as vegetable, pickled and made into salad.

Citrullus vulgaris, Dalz. & Gibs. Bby. Fl. 102. *Water melon, turbuj* (Hind.), *kalingad* (Bomb.)

Cultivated throughout India for its large oval fruit, which in some instances is very delicious and greatly prized in the hot months, as it is then very refreshing. The small flat seeds when dried taste like almonds. This is the cultivated form, but the wild species named at Gujarát *dilpussund* and *meho* in Sind is eaten as vegetable.

Benincasa cerifera, Dalz. & Gibs. Bby. Fl. Suppl. 36. *Pandri-chicki, camolenga* or *cumbulana.*

Said to be wild in India. Cultivated throughout India, Malaya, China, Japan, Africa, etc. Fruit round, oblong, about 12-18 in. long, whitish, hairy when young, smooth and covered with a waxy bloom when ripe. The meal is eaten as vegetable, cooked in various ways and made into sweets with jaggri or sugar.

Coccinia Indica, Dalz. & Gibs. Bby. Fl. 103.—*Cephalandra Indica,* Naud. in Ann. Sc. Nat. *Tendli, tenduli, bhimb.*

The oblong fruit about 2-2½ in. long, green when young, scarlet red when ripe, fleshy, smooth, is eaten both raw and cooked. The ripe fruit is sweet.

Food Plants.

Cucurbita maxima, Dalz. & Gibs. Bby. Fl. Suppl. 37. *Pumpkin* or *red gourd, dudhi bhopali.*

Cultivated throughout India, and warm parts of the globe. The fruit is large, depressed, and marked with several depressed lines. It is eaten as a vegetable.

C. pepo, D. C. Prod. iii. 317. *Kaula.*

Cultivated throughout India, and in all warm and temperate regions of the globe. The fruit is very variable, dark-green, orange-coloured or white, ribbed or unribbed, smooth or tubercled, small or as large as the fruit of *C. maxima. C. melolepo, C. ovifera* of Linn. are varieties.

C. moschata, D. C. Prod. iii. 317. *Kali-duddi, abobra de Guinea* of the Indo-Portuguese.

Fruit varies, oblong, round or compressed, marked with several lines, 1-2 ft. in diameter. The meal is yellow and of a sweetish taste.

The fruit of all these species are cut into slices and made into sweets. They are also eaten as vegetable.

Melothria heterophylla, cogn. in D. C. Prod.—*Zehneria umbellata,* Hook. Fl. Ind. ii. 225.—*Bryonia umbellata,* Dalz. & Gibs. Bby. Fl. 101. *Gometta.*

Common in Bombay and throughout India. Oval berry, size of a pigeon's egg, smooth, red when ripe; is eaten always in association with *Capparis Zeylanica* as stated above.

CACTEÆ.

Opuntia Dillenii, Dalz. & Gibs. Bby. Fl. Suppl. 39. *Prickly-pear, nagphana* (Hind.), *chappal* (Dec.)

The fruit is like a pear, covered with thin sharp spines, and containing a pulp which is highly refreshing. It is much resorted to in times of scarcity.

FICOIDEÆ.

Mollugo stricta, Dalz. & Gibs. Bby. Fl. 16. *Zarus.*

Very common. About 1 foot high. Eaten as pot-herb in all seasons.

Sesuvium portulacastrum, Dalz. & Gibs. Bby. Fl. 15.

A fleshy, prostrate herb, rooting at the joints. Common on the shores of India from Bombay to Calcutta and Singapore. Eaten as pot-herb.

Trianthema monogyna, D. C. Prod. iii. 352.—*T. obcordata,* Dalz. & Gibs. Bby. Fl. 14. *Khopra, bishkhopra, sveta punarnava.*

A common, prostrate, diffuse, succulent herb. Eaten as pot-herb.

UMBELLIFERÆ.

Apium graveolens, Dalz. & Gibs. Bby. Fl. Suppl. 41. *Celery.*

A biennial herb found in the hills of the Punjáb, Himalaya, Cabul, Europe, etc. The stalk eaten as salad.

Carum copticum, Benth. in Gen. Pl. i. 891.—*Ptychotis ajwan*, Dalz. & Gibs. Bby. Fl. Suppl. 41. *Owa, ajwan.* Food Plants.

This perennial herb, 1-3 ft. high, is widely cultivated in the Deccan, Punjáb, Bengal, etc. The aromatic seeds are used as a garnish in curries, and as medicine. It is officinal in the Indian Pharmacopœia.

C. Roxburghiana, Benth. in Gen. Pl. i. 891.—*Apium involucratum*, Dalz. & Gibs. Bby. Fl. Suppl. 41.

Extensively cultivated in Gujarát and throughout India. It is the substitute for parsley. Seeds employed as carminative in native medicine.

C. petroselinum, Benth. in Gen. Pl. i. 891.—*Apium petroselinum*, Dalz. & Gibs. Bby. Fl. Suppl. 41. *Parsley.*

Cultivated throughout India.

C. carui, D. C. Prod. iv. 115. *Caraway.*

Often cultivated and found wild in Cashmere, Garwhal and various parts of Asia and Europe. The seeds are used as an aromatic condiment. Their oil is officinal in the Indian Pharmacopœia.

Fœniculum vulgare, Dalz. & Gibs. Bby. Fl. Suppl. 41.—*F. panmorium*, D. C. Prod. iv. 142. *Common fennel, panmuohri*, or *barra-sof.*

Common in gardens. Widely cultivated throughout India.

Peucedanum graveolens, Benth. in Gen. Pl. i. 919.—*Anethum sowa*, Roxb. Fl. Ind. ii. 94.—*Dill seed, sowa* (Hind.)

The herb eaten as vegetable and the fruit used in curries as garnish, and often added to sweets on account of its sweet perfume.

Coriandrum sativum, Dalz. & Gibs. Bby. Fl. Suppl. 41. *Common coriander, danya* (Hind.), *khotbir* or *khotmir* (Bomb.)

An annual herb cultivated throughout India. Used as garnish and the fruit as condiment.

Cuminum cyminum, Dalz. & Gibs. Bby. Fl. Suppl. 41. *Cummin seed*, the *jirá* of the natives.

This annual herb is cultivated in the Deccan, Punjáb and other parts of India for the sake of its seeds, which are used as carminative and garnish in curries.

Daucus carota, Dalz. & Gibs. Bby. Fl. Suppl. 41. *Carrot, gayer* (Hind.)

Cultivated everywhere in India. In the Balághát and Deccan it thrives well, and forms during the cold season the staple food of the people.

CORNACEÆ.

Alangium Lamarckii, Dalz. & Gibs. Bby. Fl. 109. *Ankul, ankola.*

The fruit eaten.

RUBIACEÆ.

Anthocephalus cadamba, *Nhiu, Cadam, Nipa*; Bedd. Fl. Sylv. t. 35.—*Nauclea cadamba*, Dalz. & Gibs. Bby. Fl. Suppl. 43.

Food Plants.

The fruit, size of a small orange, is eaten by natives, but is not very palatable.

Mussænda frondosa, Dalz. & Gibs. Bby. Fl. 121. *Bedina* (Hind.), *sarwadh, bhurt-kasi* (Mar.)

Common in the Konkans and all over India. The white leaf of the calyx eaten as vegetable.

Randia dumetorum, Dalz. & Gibs. Bby. Fl. 119. *Ghela.*

The unripe fruit is pounded and thrown into ponds to poison fish. The fresh ripe fruit roasted and eaten; the dried fruit used as an emetic. (*See* Brand.)

R. uliginosa, Dalz. & Gibs. Bby. Fl. 119. *Kaurio.*

The fruit, cooked or roasted, is eaten in Oude and Behár.

Gardenia gummifera, Dalz. & Gibs. Bby. Fl. 120. *Dikamali.*

Fruit is eaten. (*See* Brand.)

Canthium parviflorum, Dalz. & Gibs. Bby. Fl. 113; Roxb. Fl. Ind. i. 534. *Kirni.*

A shrubby plant, usually with opposite supra-axillary thorns. Flowers in the hot season, and ripens fruit in about July.

Grows in Belgaum, Southern Marátha Country, Travancore and Coromandel, etc. The natives use the leaves in curries.

Vanguiera spinosa, Roxb. Fl. Ind. i. 536.—*V. edulis*, Dalz. & Gibs. Bby. Fl. 114. *Atu.*

Fruit eaten by the natives, but unpalatable. It has a rather large stone.

Pavetta Indica, Dalz. & Gibs. Bby. Fl. 112. *Paput.*

A shrub common in the gháts; flowers in April and May in large, globose, white corymbs. Fruit pickled and eaten in some parts of the Madras Presidency, and the flowers also eaten by the hill people of Mátherán.

Coffea Arabica, Dalz. & Gibs. Bby. Fl. Suppl. 44. *Kawa, caffi, bun.*

This is the well-known coffee tree extensively cultivated in Southern India and throughout the tropics of both hemispheres. Of late *Coffea siberica* is being introduced in India.

Morinda citrifolia, Dalz. & Gibs. Bby. Fl. 114. *Bartundi, aal, ainshe.*

The fruit when ripe is eaten, while the green ones are used in curries.

M. umbellata, D. C. Prod. iv. 449.

Cultivated. The ripe fruit eaten; the green ones used in curries.

COMPOSITÆ.

Eclipta prostrata, Dalz. & Gibs. Bby. Fl. 127. *Maka, bangrak.*

This very common weed is used as a pot-herb.

Helianthus tuberosus, Dalz. & Gibs. Bby. Fl. Suppl. 47. *Jerusalem artichoke, brahmoka* (Beng.)

Food Plants.

This plant is cultivated successfully throughout India for the sake of its tuber, which is a very delicious vegetable.

H. annuus, Roxb. Fl. Ind. iii. 443. *Sunflower, suraj-maki.*,

The receptacle and the roasted seeds are eaten. The oil is also used for culinary purposes. (*See* Oils.)

Spilanthes acmella, Dalz. & Gibs. Bby. Fl. 129.

Erroneously supposed to be the source of akalkara of the bázárs. It is said to be cultivated as a pot-herb in Poona. In Silhet, where it is indigenous, the leaves are eaten as pot-herb.

Guizotia Abyssynica, Cass. in Dic. Sc. Nat. 59-248.—*G. oleifera,* Dalz. & Gibs. Bby. Fl. 128.

The oil is used for lamps and culinary purposes. (*See* Oils.)

Cynara scolymus, Dalz. & Gibs. Bby. Fl. Suppl. 45. *Artichoke, kingin,*

This vegetable and its variety, cardoon (*C. carduriculus*), are generally cultivated in India, but not with full success, for the leaves are fully developed before the involucre is well formed. The immature flower head and involucre and receptacle are eaten.

Carthamus tinctorius, Dalz. & Gibs. Bby. Fl. Suppl. 45. *Safflower, kosumba, kardai.*

The herb is said by Dr. Birdwood to be eaten, in reference probably to the tender leaves of the cultivated plant which are not spinous, and are used as an article of food. The roasted seeds are eaten; they were much procured by well-to-do people during the late famine at Sholápur. The cake is excellent for fattening poultry. The plant is extensively cultivated throughout India for the use of dyers. The Bombay plant is not so good as that from Bengal or Madras for the latter purpose. (*See* Oils.)

Cichorium endiva, Dalz. & Gibs. Bby. Fl. Suppl. 45. *Kassani.*

Cultivated; when properly blanched, is said to be as delicate as the following.

Lactuca sativa. *Garden letuce, kahu* (Hind.)

Herb eaten as salad.

Launæa pinnatifida, Cass. Ann. Sc. Nat.—*Mychrorhyncus sarmentosus,* Dalz. & Gibs. Bby. Fl. 132.

Leaves eaten as a pot-herb.

GOODENIACEÆ.

Scævola taccada, Dalz. & Gibs. Bby. Fl. 134. *Bhadrak.*

Leaves eaten as vegetable.

SAPOTACEÆ.

Achras sapota, Dalz. & Gibs. Bby. Fl. Suppl. 50. *Naseberry, sapota-plum, chiku* (Bomb.)

The fruit, size of a small orange with a dark-brown skin and a yellowish pulp, is delicious and agreeable. The tender rind covers a juicy pulp and almond-like seeds.

Food Plants.

Mimusops elengi, Dalz. & Gibs. Bby. Fl. 140. *Buckhool, wowli.*

The fruit eaten.

M. Indica, D. C. Prod. viii. 205—*M. hexandra,* Dalz. & Gibs. Bby. Fl. 140. *Kerni, ranjan.*

The fruit eaten.

M. Kanki, Dalz. & Gibs. Bby. Fl. Suppl. 50. *Khirni.*

The fruit is known at Goa as *pome* or *fructa d'Adão* (Adam's fruit). It resembles an Ahmedabad bhôr (*Zyzyphus jujuba*); is slightly acid, and is eaten.

Bassia latifolia, Dalz. & Gibs. Bby. Fl. 139; Roxb. Corom. Pl. t. 19. *Mowah* or *mawrah-tree.*

It yields the well-known *mowah* flowers from which *mawrah spirit* is largely distilled for exportation in Uran, Surat and Poona. Both the ripe and the unripe fruit is eaten by the natives, but perhaps the most important product of this plant is the flower, of which 200 to 400 lbs. are sometimes collected from a single tree. These flowers are always gathered early in the morning, dried in the sun, and then sold as an article of food, being consumed either raw or cooked along with parched grain. Many of those who have gone to Mátherán must have seen the natives at the foot of this hill collecting the flowers of the *mowah* which are much esteemed by them, and indeed during the famine of 1873-74 at Behár they are said to have kept thousands of people from starvation. They have a sweetish smell and taste. The seeds of the *mowah* yield by expression a greenish yellow oil which is used by unscrupulous dealers for adulterating ghee. It is also used in making soap in Kaira. The oil cake is employed for poisoning fish, and when burnt its smoke is reported to be a good insecticide and to kill rats also. The timber is of very fair quality. (*See* Oils and Timber Trees.)

B. longifolia, Dalz. & Gibs. Bby. Fl. 139; Roxb. Fl. Ind. ii. 523. *Ippi, ilupi,* also sometimes named *mowah.*

This is equally useful as the last, and the flowers and seeds are used for the same purposes. Grows at Dhárwár, Malabár, Circárs, Mysore and the Annamallay Hills.

EBENACEÆ.

Diospyrus melanoxylon, Roxb. Fl. Ind. iii. 530.—*D. exculpta,* Dalz. & Gibs. Bby. Fl. 142. *Timburni, temru, tumri.*

This is a middle-sized tree found in various dry parts of India; fruit yellow when ripe, globose, 1-1½ in. across. Pulp yellow, soft, sweet; eaten.

D. Goindu, Dalz. & Gibs. Bby. Fl. 141.—*D. montana,* Roxb. Cor. Pl. t. 48.—*D. cordifolia,* Roxb. (Cor. Pl. t. 50). *Goindu, kundu, temru.*

Common on the gháts and throughout India. The fruit globose, size of a large cherry, yellow when ripe, is said by Dr. Birdwood to be eaten as fruit.

D. chloroxylon, Roxb. Cor. Pl. t. 49; Fl. Ind. ii. 538; Dalz. & Gibs. Bby. Fl. 140. *Ninai.*

A large tree found at Surat, Násik, Gujarát and Southern India as far as Orissa. Fruit globose, size of a large pea; eaten when ripe. Food Plants.

D. embryopteris, Bedd. Fl. Sylv. t. 60.—*Embryopteris glutinifera*, Roxb. Cor. Pl. t. 70. *Gab, kusi.*

Common on the hilly parts of Sálsette (*see* Grah. Cat. Bby. Pl.) and in Southern India. The fruit is globose, size of a crab-apple; said by Dr. Birdwood to be eaten as fruit.

Maba buxifolia, Roxb.—*M. nigrescens*, Dalz. & Gibs. Bby. Fl. 142. Ripe fruit is eaten; said to be palatable.

OLEACEÆ.

Olea dioica, Dalz. & Gibs. Bby. Fl. 159. *Parjamb.*

This tree bears fruit about the size of a Spanish olive, and is eaten in curries and also pickled.

GENTIANEÆ.

Limnanthemum cristatum, Dalz. & Gibs. Bby. Fl. 158. (*See* "Wild Herbs and Tubers".)

This is eaten at all times, but specially in seasons of scarcity.

ASCLEPIADEÆ.

Holostemma Rheedei, Dalz. & Gibs. Bby. Fl. 148. *Sidodi.* Leaves and flowers eaten as vegetable.

Sarcostemma brevistigma, Dalz. & Gibs. Bby. Fl. 149. *Sôma.*

A leafless twining plant, common in the Deccan and other dry places. "The plant yields a quantity of milky juice, but of such a mild nature that travellers often suck the tender shoots to allay thirst".—Roxb. Has this juice any intoxicating effect, as stated by some?

Leptadenia reticulata, Dalz. & Gibs. Bby. Fl. 152.—*Asclepias tuberosa*, Roxb. Fl. Ind. ii. 38.

A twining shrub with corky bark. Very common, particularly near the sea. The leaves and tender shoots are used as a vegetable at all times, specially during scarcity.

Ceropegia bulbosa, Dalz. & Gibs. Bby. Fl. 153. *Patalatum bari.*

Common in Bombay and elsewhere. Every part of this plant is said to be eaten by the natives, either raw or stewed in their curries. The fresh roots taste like raw turnips.

Caralluma fimbriata, Dalz. & Gibs. Bby. Fl. 155. *Makarsing.*

A small, fleshy, leafless, cactus-like stem of the thickness of a man's finger with small flowers—white and pink—curiously fringed with hairs at the top of the branches. About Dhárwár, and sparingly scattered over the Deccan. Eaten as a vegetable.

APOCYNEÆ.

Carissa carandas, Dalz. & Gibs. Bby. Fl. 143. *Karanda* (Bomb.)

Food Plants.

Found everywhere in India. The fruit, black, is about the size of a marble, and contains several small seeds. It makes a good pickle when unripe, and tarts and puddings when ripe. Jelly is also made from it, and posted for local sale and exportation. It has to be thrown into salted water a little before being eaten, whereby the taste is improved. Wine is also made in a small quantity at Goa for local consumption.

C. lanceolata, Dalz. & Gibs. Bby. Fl. 143.

The fruit like that of the last; eaten.

C. spinarum, Dalz. & Gibs. Bby. Fl. Suppl. 53.

Said to have been introduced from the Eastern Islands; looks beautiful when covered with its white and bright red fruit. This last is eaten in tarts.

Wrightia tinctoria, Dalz. & Gibs. Bby. Fl. 145. *Kalla-kuda.*

Tender leaves and pods eaten as vegetable.

LOGANIACEÆ.

Strychnos nux-vomica, Dalz. & Gibs. Bby. Fl. 155. *Kajra.*

Common in the Konkan and throughout India. The seeds yield the deadly poison *strychnia*; but "there can be no doubt," says Dr. Birdwood, "that this fruit is commonly eaten in the Konkans for the sake of the pulp enclosing its deadly seeds." The latter are removed, and the pulp alone is eaten.

S. potatorum, Roxb. Fl. Ind. i. 576; Dalz. & Gibs. Bby. Fl. 156. *Gajrah, nirmali.*

A middle-sized tree common all throughout India in the Konkan, Southern Marátha Country and the ghâts. The ripe fruit is eaten; the dry seeds are employed for cleaning muddy water; hence the fruit is known as "*clearing-nut*".

BORAGINEÆ.

Ehretia lævis, Dalz. & Gibs. Bby. Fl. 170. *Tambolli* (Beng.), *paldantum* (Tel.)

The fruit eaten.

Cordia Rothii, Dalz. & Gibs. Bby. Fl. 174. *Gundni* (Hind.)

The pulp of the drupe is viscous, and though insipid is eaten.

C. myxa, Dalz. & Gibs. Bby. Fl. 173. *Bargund, vargund* (Mar.); *lepistan pistan* (Guj.); *lesuri geduri* (Sind.)

A middle-sized tree, wild and cultivated throughout India. Unripe fruit is eaten pickled and cooked as vegetable. The ripe fruit is eaten by men and birds. The viscid pulp is used as bird-lime.

CONVOLVULACEÆ.

Calonyction speciosum, Dalz. & Gibs. Bby. Fl. 164. *Bania-bauri, gulchandri.*

The fleshy peduncles with the unripe seed vessels eaten as vegetable.

Ipomœa batatas, *Batatas edulis*, D. C. Prod. ix. 338. *Rataln, shakar-kandu* (Dec.)

Very generally cultivated all over India. The tuber is sweet, is eaten as vegetable, and made into sweets. **Food Plants.**

I. reptans, Dalz. & Gibs. Bby. Fl. 164. *Pan-vel, nari.*

Common on the banks of rivers and borders of tanks. The leaves eaten as a pot-herb.

SOLANACEÆ.

Lycopersicon esculentum, Dalz. & Gibs. Bby. Fl. Suppl. 9. *Love-apple, tomato, wal-wangi* (Bomb.)

The fruit eaten as salad and also made into sauce. Two varieties are cultivated: one with large fruit, size of an orange and marked with several longitudinal depressed lines, and the other the small round variety.

Solanum tuberosum, Dalz. & Gibs. Bby. Fl. Suppl. 60. *Botata ratala alu.*

Tuber eaten as vegetable. Several varieties of this useful tuber are cultivated throughout India; that produced at Mahábaleshvar in this Presidency was reddish and highly esteemed, but the stock is now deteriorated. The potatoes cultivated lately in Sind are said to be very good.

S. melongena, Dalz. & Gibs. Bby. Fl. Suppl. 61. *Egg-plant, waingi, vengan* (Bomb.), *brinjal.*

This vegetable is extensively cultivated throughout India. There are two chief varieties: one with large oblong fruits more of the form of a cucumber, and the other size of a large orange or larger. The fruits of both kinds are of a fine polished green or more or less deep purple. They are eaten as vegetable variously cooked and made into salads or omolette, prepared by the cavity being filled up with minced meat, or prawns cut into small pieces, etc.

S. nigrum, Linn. Sp. Pl. 266. *Kamuni.*

It is a small annual or biennial plant common in all tropical and temperate parts of the world. The berries, which are black, yellow, or red, are eaten, even in Australia.

Physalis Peruviana, Dalz. & Gibs. Bby. Fl. Suppl. 61. *Cape gooseberry, mako.* (Hind.), *phopti* (Mar.), *chirput* (Goa and Konkan). Found in many places of India. The fruit has an agreeable acid taste, and makes an excellent jam or preserve; used also in tarts.

Capsicum frutescens, Dalz. & Gibs. Bby. Fl. Suppl. 61. *Lalmirchi.*

There are several varieties cultivated in this Presidency.

BIGNONIACEÆ.

Sterospermum xylocarpum, Hook. & Benth. Gen. Pl. ii. 1047.—*Bignonia xylocarpa*, Dalz. & Gibs. Bby. Fl. 159. *Korsing.*

Young pod eaten as vegetable.

PEDALINEÆ.

Sesamum Indicum, Dalz. & Gibs. Bby. Fl. 161. *Gingelly-oil plant, til, krishna-til, barik-til.*

Food Plants.

The roasted seeds are eaten alone or made into cakes and *ladhus* with sugar or *jaggri.* (*See* Oils.)

VERBENACEÆ.

Gmelina aborea, Dalz. & Gibs. Bby. Fl. 201. *Sirvan* or *surni.*

This tree is common.

The drupe is smooth, yellow when ripe, 1 in. long, eaten as fruit.

Chlerodendron serratum, Dalz. & Gibs. Bby. Fl. 200. *Bharang.*

Tender leaves eaten as vegetable.

LABIATEÆ.

Coleus barbatus, Dalz. & Gibs. Bby. Fl. 205. *Garmal.*

The aromatic root is pickled and much used, especially by Gujarátis. Wild and cultivated for the sake of the roots.

C. aromaticus, Dalz. & Gibs. Bby. Fl. Suppl. 66. *Country borage, pathar-chur.*

It is said to be a native of Northern India, but common in gardens. It forms an agreeable addition to the cooling drinks used in the hot season. The leaves, which are very fragrant, are eaten with bread and butter, and mixed with various articles of drink, food or medicine.

Anisochilus carnosus, Dalz. & Gibs. Bby. Fl. 20[illegible]. *[illegible]anva. Thick-leaved lavender* of the English.

The leaves are used as condiment.

Mentha viridis, D. C. Prod. xii. 168. *Mint, spear-mint, pudina,* or *pahadi-pudina.*

M. arvensis, D. C. Prod. xii. 171. *Pudina.*

Both these species are cultivated in gardens; both, specially the latter, are much used as condiment.

M. piperita, D. C. Prod. xii. 169. *Peppermint, piprimut.*

Cultivated; thrives well in this country, delighting in a good soil and shady place. In habit and general appearance it much resembles the common mint.

Origanum vulgare, D. C. Prod. xii. 193. *Marjoram, marwa, marru, mardakush, sathra.*

This herb is not much used for culinary purposes.

Thymus vulgaris, Dalz. & Gibs. Bby. Fl. Suppl. 67. *Thyme, ipan, hasha.*

Cultivated, but does not thrive well in this country. Used as condiment.

Meriandra Benghalensis, Dalz. & Gibs. Bby. Fl. 66. *Bengal sage.*

Cultivated in gardens. It is a large glaucous shrub resembling much the true sage of English gardens. It has a strong camphoraceous smell when bruised. It is much used in Bengal as a condiment under the name of sage.

Salvia officinalis, D. C. Prod. xii. 264. *Sage, salbia sefakuss.*

Cultivated from seeds brought from Europe. Used as condiment. **Food Plants.**

Anisomeles Malabarica, Dalz. & Gibs. Bby. Fl. 210. *Gaozaban* or *gul-i-gaozuban.*

Common at the ghâts. Used as a condiment. The leaves are bitter, and are used as a tonic and against flatulence.

CHENOPODIACEÆ.

Beta vulgaris, Dalz. & Gibs. Bby. Fl. Suppl. 73. *Common-beet, palak, chukundar, chinchindu.*

Much cultivated throughout India. The root eaten as salad. The variety that is deep-coloured is generally held in the highest estimation.

Chenopodium album and its variety, *C. viride;* D. C. Prod. xiii. S. 2-70. *Chakwit.*

These are cultivated throughout India and eaten as vegetable.

Spinacia oleracea, Dalz. & Gibs. Bby. Fl. Suppl. 73. *Common spinach, palak, isfanaj.*

The herb is eaten as vegetable. Two varieties are cultivated, the smooth-seeded with round leaves, and the prickly-seeded with triangular leaves.

Arthrocnemum Indicum, Dalz. & Gibs. Bby. Fl. 212 *Mac[illegible]*

The herb is common in salt-ground, and is sold in the bázár; it is eaten pickled, or as a pot-herb.

Basella alba; B. rubra, Dalz. & Gibs. Bby. Fl. Suppl. 73. *Myal-ke-baji, nal-chi-baji,* or *yal-chi-baji.*

A twining plant with succulent red or green stems and leaves.

Cultivated by people of this country against their dwellings. The leaves and tender stalks used as a pot-herb much in the way of spinach.

AMARANTACEÆ.

Amaranthus paniculatus, Dalz. & Gibs. Bby. Fl. 215.—*A. frumentaceus,* Roxb. Fl. Ind. iii. 699. *Cahola-baji.*

An erect stout annual with greenish-coloured striated stem 5-6 ft. high, the foliage and inflorescence assuming a reddish hue.

Common everywhere. Leaves eaten as vegetable. It is cultivated in some parts, chiefly for the flour of its seeds, which is a much prized article of food.

A. tristis, Dalz. & Gibs. Bby. Fl. 215. *Chulai.*

Common; wild and cultivated. It resembles *A. campestris.* Leaves and young shoots eaten.

A. oleraceus. *Tandulja, tambri-mat.*

Described in Dalz. & Gibs. Bby. Fl. 216 under the name of *Euxolus* with its varieties *A. viridis, A. giganteus,* etc., is wild and cultivated throughout India. Leaves eaten.

A. spinosus, Dalz. & Gibs. Bby. Fl. 216.

A weed common in gardens. Leaves eaten.

A. polygonoides—Amblogyna of Dalz. & Gibs. Bby. Fl. 218.

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Stem about 1 ft. high. Young shoots and leaves eaten.

Celosia argentea, Dalz. & Gibs. Bby. Fl. 215. *Kudhu.*

An annual herbaceous plant common throughout India in the rainy season. Leaves and young shoots eaten.

Mengea tenuifolia, Dalz. & Gibs. Bby. Fl. 218.

A common weed; used as a pot-herb.

POLYGONACEÆ.

Rumex vesicarius, D. C. Pród. xiv. 70. *Chuka-ke-baji, chuka, ambari-chucka.*

The herb eaten as garnish.

Fagopyrum esculentum, D. C. Prod. xiv. 143. *Buck-wheat.*

Native of Nepaul, Assam, Kumaon; cultivated in the Deccan, where the grain is eaten roasted as a fast-day food by Hindus.

MYRISTACEÆ.

Myristica Moschata or **M. officinalis**, Dalz. & Gibs. Bby. Fl. Suppl. 75. *Nutmeg-tree, jaya-phala, jayapatri* (the aril).

A native of the Moluccas and other eastern islands where it is much cultivated for the sake of the well-known spicy arils of its fruit. It has been successfully reared at Sion and Poway and in other places, but does not thrive well away from the sea-coast. The aril is only used as a spice.

M. Malabarica, M. attenuata, Dalz. & Gibs. Bby. Fl. 4. *Maya-putri* (arillus); *mayaphala, ran* or *jungli jayaphala.*

These two trees, indigenous to the forests of the Konkan and Malabár, furnish what is known as Malabár nutmeg.

M. tomentosa of Penang also furnishes a nutmeg which is substituted for the above.

LAURACEÆ.

Cinnamomum Zeylanicum, D. C. Prod. xv. 1-13. *Taj, dalchini.*

This is the true cinnamon tree, a native of Ceylon and naturalized in Bombay and the Konkan, and may be recognized by its thick, opposite, oblong, coriaceous leaves, pale beneath, 3-nerved at the base, terminal lax panicles, silky, 6-fid perianth, of which the lobes during a time fall off near the base, the remaining part being persistent, 9 antheriferous, stamens of which 3 have a pair of glands at the base, 3 staminodes, and small oblong, ½ in. long fruit, black when ripe.

The bark used as condiment. (*See* Oils.)

Persea gratissima, D. C. Prod. xv. 52; Dalz. & Gibs. Bby Fl. Suppl. 75.

The *alligator* or *avocate pear* of the West Indies, indigenous in South America, introduced in India. It is a tree 30-40 ft. high, grows in gardens at Belgaum, has paniculate greenish white flowers, and a pear-shaped fruit 3-4 in. long. The fruit produced in this

Presidency is not very delicate. It is said that in the West Indies and in tropical America the fruit is eaten raw, or as a vegetable. Food Plants.

ELÆAGNACEÆ.

Elæagnus latifolia, Wight. Icon. t. 1856.—*E. conferta*, Dalz. & Gibs. Bby. Fl. 224. *Nargi, ambgul.*

A large climbing shrub with ovate leaves, shining and silvery beneath and green above. The fruit succulent, rather acid, which when boiled and sugared is not unpalatable. When ripe it is pale, red or yellow, size of a damson. It has a single stone marked with 8 prominent ribs.

EUPHORBIACEÆ.

Phyllanthus emblica, Bedd. Fl. Sylv. t. 258.—*Emblica officinalis*, Dalz. & Gibs. Bby. Fl. 235. *Avala.*

Often grown in gardens for its small acid fruit which makes pretty good pickle. The unripe fruit eaten raw or pickled, also used as medicine for dyeing and tanning. It is known in commerce as emblic myrabolan.

Cicca disticha, Dalz. & Gibs. Fl. Suppl. 78. *Harfarori, narphala, cherambola, rose avala* (Goa).

Cultivated in gardens. This plant produces a small, yellowish, white fruit, marked with several longitudinal lines, which is used for pickle. The fruit being sour is not fit to be eaten raw, but makes a good compote when cooked and sweetened.

Securinega obovata, Bedd. Fl. Sylv. 197.—*Fluggea virosa*, Dalz. & Gibs. Bby. Fl. 236.

The fruit is eaten; but being poisonous, not safe to eat.

S. leucopyrus, Bedd. Fl. Sylv. 197.—*Fluggea leucopyrus*, Dalz. & Gibs. Bby. Fl. 236.

Fruit eaten.

Antidesma diandra, Dalz. & Gibs. Bby. Fl. 237. *Ambli.*

Found throughout India, at Vengúrla, etc. The drupe small, of a pleasant acid taste; is eaten as fruit. The leaves, which are also acid, are made into chutney.

Briedelia retusa, Bedd. Fl. Sylv. t. 250.—*B. montana*, Dalz. & Gibs. Bby. Fl. 233. *Phatar-phor, assana.*

A common tree with or without thorns. The fruit globular, succulent, size of a pea, black when ripe, is sweet and edible.

Aleurites moluccana, Bedd. Fl. Sylv. t. 276.—*A. triloba*, Dalz. & Gibs. Bby. Fl. Suppl. 76. *Akhrut* (Bomb.), *Belgáum walnut, hijlibaddam.*

The nut is roundish, size of a walnut, and like it has a good flavour.

Trewia nudiflora, Dalz. & Gibs. Bby. Fl. 231. *Petari.*

A large tree with long-petioled, heart-shaped leaves, resembling those of *Thespesia populnea.* The drupe depressed, globose, 1 in. diam. The pulp under the rind is sweet and edible.

Jatropha manihot, Dalz. & Gibs. Bby. Fl. Suppl. 77.

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The *tapioca, mandioca* and *cassava plant* introduced by the Portuguese in Goa, and has thence spread into gardens, and is extensively cultivated in Cochin, Travancore, and throughout Southern India. Birdwood quotes the following from Monardes and Piso:—

"The rasped root mixed with water, boiled and fermented, yields a liquor called *cassiri*. Cassava meal is obtained by subjecting the grated root to pressure to express the juice, and then drying and pounding the residual cake. Of this meal cassava-bread is made. The expressed juice by repose deposits the farina called cassava starch or tapioca. A sauce called cassareep or cassireepe is made from the juice."

The juice of the root is poisonous, and is said to be used by South Americans for poisoning their arrows. This poison, known as mandioca poison, is obtained by distillation, although it can only be expelled by the roots being roasted or boiled. Cases are reported of people being poisoned by incautiously eating the root before it is properly baked or boiled. The tapioca is a nourishing food, and affords a light diet for sick people. Cassava flour is also nourishing, and many poor people in Travancore and Southern India use it as food during the rainy months when rice is scarce and dear.

URTICACEÆ.

Artocarpus integrifolia, Dalz. & Gibs. Bby. Fl. 244. *Jack-fruit-tree, jaca, panas.*

This tree is found in most parts of India producing about the largest known fruit, which is of two kinds—*ghillu* or the soft, and *kajja* or the hard kind, the latter being very generally preferred. The two varieties are known here and in Goa as *rassal* and *kappa*. It is said that a thick jelly-like substance of an agreeable melon-like taste can be made by boiling the pulp in fresh milk and straining the whole. The seeds, roasted or boiled, are eaten, and are as good as chestnuts. The unripe fruits and seeds are eaten as vegetable.

A. incisa, Dalz. & Gibs. Bby. Fl. Suppl. 79. *Bread fruit tree.*

A handsome tree producing a large oval fruit much like the preceding, though smaller in size. It has got its name from its resemblance when roasted to the crumb of a fresh loaf.

A. Lakoocha, Dalz. & Gibs. Bby. Fl. 244. *Diphal* (Beng.), *watlam* (Goa).

The ripe fruit eaten, and the unripe fruit cut into slices, used in curries, or dried and kept for use as kokam.

Ficus carica, Dalz. & Gibs. Bby. Fl. Suppl. 80. *Common fig, anjir.*

The fig tree is cultivated almost all over India. The fruit, which is of the size of a small apple, is sweet. That growing in Bombay is superior in quality to that found at Poona and other places. This plant is easily propagated.

The ripe fruit of *Ficus glomerata, umbar; F. cordifolia, pair,* and other wild fig trees are eaten. The tender shoots of *F. infectoria* are eaten in curries.

Morus Indica, Dalz. & Gibs. Bby. Fl. Suppl. 80. *Tul* or *tula, umbor.*

Generally cultivated for its leaves, which are used to feed the silkworm. The fruit eaten. Food Plants.

M. alba, Dalz. & Gibs. Bby. Fl. Suppl. 80. *Tut, tuklu.*

Cultivated in Cashmere and many other parts of India. The leaves of this tree are chiefly used for feeding the silkworm. The fruit, of which there are many varieties—white, purple and black, acid and sweet—is eaten.

PIPERACEÆ.

Piper nigrum, Dalz. & Gibs. Bby. Fl. Suppl. 84. *Miri, kala-miri.*

Denuded of its outer covering it is called *safed-miri* (white pepper). Terete, woody stems rooting from the lower nodes, coriaceous, alternate, petioled, broad-ovate leaves, cordate, 5-ribbed at the base with 2 strong ones arising from the mid-rib immediately above these, monœcious or diœcious spikes arising opposite the leaves. 2 anthers, 5-6 stigmas, and a sessile fruit size of a pea. The part used in commerce is the dry wrinkled fruit employed as a condiment and in medicine. It is cultivated throughout India from the earliest ages and in this Presidency from Sind up to Dhárwár, and over some of the ghâts. The fruits of the following plants are said to be substituted for true pepper:—*Nigela sativa; Zantoxylon Badrunga; Z. Rhetsa; Vitex negundo* or *bicolor;* and *Myrtus communis.*

The pepper vine is indigenous to Malabár and Travancore, and is now cultivated throughout India, Malay Peninsula, Java, Sumatra and West Indies. The plant is propagated by being planted on a rich soil near the trees on which or bamboo poles it is made to climb. It attains the height of 20-30 ft., but is usually kept down.

Pepper is one of the spices earliest used by mankind, it having for many ages been the staple article of trade between Europe and India. It was known to be of two kinds (black and long) to Theophrastus who flourished in the fourth century, and in the time of Pliny the long variety used to be sold for 15, the white for 7, and the black for 4 *denarii* the pound. It began to be more generally used in Europe during the Middle Ages, and was the "very symbol of the spice trade to which Genoa, Venice and the commercial cities of Central Europe were indebted for a large part of their wealth; and its importance as a means of promoting commercial activity during the Middle Ages, and the civilizing intercourse of nation with nation can scarcely be overrated."

Piper betle, Dalz. & Gibs. Bby. Fl. Suppl. 84. *Betel-leaf plant, pán.*

Scandent shrub rooting at the lower nodes, leaves alternate, membranous; bract ovate, cordate, 7-ribbed at the base with 2 more ribs rising immediately above these, from the mid-rib, spikes half a foot long arising opposite the leaves, and a globose fruit size of a pea.

It is cultivated throughout India, and in various places in this Presidency, but that which is produced in Poona, Sátára and above the ghâts is preferred. A large quantity is brought down from these places to

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Bombay. It is chiefly consumed here, and partly exported to Karáchi. The leaves are used as a masticatory folded with powdered cardamom, chalk, and areca-nut. They are carminative and stomachic, and assist in promoting digestion. In Sátára and Poona the betel-vines are planted near the roots of *Melia azadarack, Moringa pterigosperma* and *Sesbania Ægyptiaca* over which they are made to climb. Besides giving support these trees afford the necessary shade, which is much needed for their successful cultivation. Bamboo posts are also used for support.

LORANTHACEÆ.

The fruits of several parasitic species belonging to this order contain sweet mucilage, which is chewed by hill people.

SANTALACEÆ.

Osyris Wightiana, Dalz. & Gibs. Bby. Fl. 223. *Popli, Belgaum lotal.*

This large shrub is common on the gháts. Drupe sub-globose, ¼ in. long; red when ripe, sweet and very pleasant.

GNETACEÆ.

Gnetum scandens, Dalz. & Gibs. Bby. Fl. 246. *Kumbal, kumbli, umbli.*

A stout scandent shrub, common in the gháts, Khandála, Mahábaleshvar, etc. The red fruit and the seeds are said to be eaten.

SCITAMINEÆ.

Musa paradisiaca, Linn. Sp.—*M. sapientum,* Dalz. & Gibs. Bby. Fl. Suppl. 88. *Common plantain, banana, khela.*

Cultivated throughout the tropics. Of this plant there are several varieties, all producing fruits of a peculiar pleasant taste which are designated by the general name *plantain.* The ripe fruit denuded of its rind is often cut in longitudinal slices and dried in the sun, and kept in well-covered jars to be used at desert. The dried plantain is an article of commerce in Bombay and many parts of India. An excellent jelly is made varying in consistency according as it is wished for immediate use or to be preserved for a length of time. In Mauritius, West Indies and South America the fruit dried in the sun is reduced to powder, and this powder is given as a light, nourishing food to infants and invalids. It is stated that the banana is highly nutritious, and equally with the potato is fitted to sustain the strength of the human body. The flowers, unripe fruit, tender spathes and spadix eaten as vegetable.

Zinziber officinale, Dalz. & Gibs. Bby. Fl. Suppl. 87.

The fresh root is called *alch* or *alem, adu, adrack*; the dry root *sunt* or *sunta.* A small, annual, reed-like plant with distichous radical leaves.

It is indigenous to Asia, and is now cultivated throughout India, tropical America, Africa and Queensland in Australia. It is planted in May or beginning of June, and the produce is gathered in the following February and March or earlier. The tuberous roots form the *alch* of commerce, and are used as condiment.

Curcuma longa, Dalz. & Gibs. Bby. Fl. Suppl. 87. *Halád* or *halada, haldi.*

Is indigenous to Southern India, and is now cultivated in various parts of the country, and used as condiment or for dyeing. In Gujarát and Kaira it is planted towards the end of May, and yield from 60-300 maunds (of 26 lbs. each) per *bigah*. The *halad* of commerce is the tuberous root roasted to dryness in ovens. **Food Plants.**

C. Angustifolia, Dalz. & Gibs. Bby. Fl. 274. *East Indian arrowroot plant, tickar.*

It is an annual plant springing up at the beginning of the rains. Bulbs with oblong tubers hanging from the fibres; leaves narrow, lanceolate petioled; striated with fine longitudinal lines, petioles 6-10 in. long; spike radical, 4-6 in. long, crowned with a coma of purple bracts, flowers yellow, large, expanding in the morning and fading at sunset. It grows wild in various parts of India, Travancore, Nagpore, etc., and in Bombay at Rám Ghát.

This species is said to yield a portion of what is called *Travancore arrowroot.* There is no doubt that curcuma arrowroot (known in this country as *tickar*, and to Europeans as *East India arrowroot*) is extensively manufactured in Southern India, specially in Cochin, Travancore and Kánara, but in a very rude manner, the granules resembling much those of *Marantha arundinacea*, which is also cultivated in India, and in fact what is called *tickar* arrowroot is often the produce of the latter plant, or curcuma starch mixed with that of cassava or tapioca plant.

There exists much confusion regarding the curcumas yielding *tikars*. Royle says:—

"The pendulous tubers of *Curcuma rubescens*, *C. leucorrhisa*, and *C. angustifolia* yield a very beautiful fecula or starch which forms an excellent substitute for the West Indian arrowroot, *Marantha arundinacea.* It is sold in the bázárs of Benares, Chittagong and Travancore, and eaten by the natives; a very excellent kind called *tickar* is also made at Patna and Boglipore from the tubers of *Batatas (Ipomœa) edulis.*"

Drury thus describes the mode of preparing arrowroot at Travancore:—

"The tubers are first scraped on a rough stick, generally part of the stem of the common rattan, or any plant with rough prickles to serve the same purpose. Thus pulverised the flour is thrown into a chatty of water, where it is kept for about two hours; all impurities being carefully removed from the surface. It is then taken out, and again put into fresh water, and so on for the space of four or five days. The flour is ascertained to have lost its bitter taste when a yellowish tinge is communicated to the water, the whole being stirred up, again strained through a piece of coarse cloth, and put in the sun to dry. It is then ready for use.—Roxb. Pers. Obs."

C. caulina, Dalz. & Gibs. Bby. Fl. 275. *Chowar.*

Large bulb with oblong tubers pendulous from the fibres. Leaves 12-20 in. long, upper alternate, short-petioled, frequently tinged red. Scape leafy, 2-3 ft. high. Coma of white bracts. Flowers yellow.

Very common at Mahábaleshvar. First described by the late Mr. Graham of the Bombay Civil Service.

Curcuma caulina grows at Mahábaleshvár abundantly, and for many years the Chinese ticket-of-leave men used to manufacture arrowroot from it, and sell it to the Commissariat, and in the bazárs at Bombay. In 1878 a European prepared a few hundred pounds of it, and sent samples to be tried by Messrs. Treacher & Co., Phillips & Co., and Kemp & Co., but it was

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found wanting in nutritive properties, though no objection was made to the colour and taste. That it is inferior to West Indian arrowroot, may be gathered from its market value, 5 to 6 lbs. to the rupee.

During the famine of 1877 it was recommended to the suffering poor, but they never used it except in extreme scarcity.

The preparation of arrowroot at Mahábaleshvar is simple. The root (of which a cooly will gather 4 or 5 large basketsful a day for as many annas) is scraped, washed and rubbed to pulp on a grater, as mortars are found to crush the globules. The pulp must then be washed no less than a dozen times at least, the sediment being stirred at each washing. The dark scum on the sediment and the muddiness of the water of the first washing slowly disappear, till when the sediment is pure white it is allowed to harden into a cake, which is afterwards reduced to powder. A basketful of roots yields 3-4 lbs. of pure arrowroot.

C. pseudo-montana, Dalz. & Gibs. Bby. Fl. 275. *Sinderwani, sinderbur, sindelwan, hellounda.*

Bulb oblong with round, small, potato-like tubers, hanging from the fibres. Leaves including the petiole 2-3 ft. long, narrow at both ends, 6-19 in. broad in the middle, quite green. Coma of a beautiful dark-rose colour, waved. Flowers yellow; appear in September.

This plant, which was first described by Mr. J. Graham, is common in the Konkan, where it arises at the beginning of the rainy season. The tubers, which are perfectly white inside, are boiled and eaten by the people during seasons of scarcity. Perhaps this plant, too, yields a part of East India arrowroot; that which comes from Ratnágiri is manufactured from its tubers.

Elettaria cardamomum, Maton.—*Alpinia cardamomum,* Roxb. Fl. Ind. i. 70; Cor. Pl. t. 226. *Ilachi, Malabari-elachi, cardamom.*

A perennial plant with erect jointed stem, 6-12 ft. high. Leaves lanceolate, acuminate 1-2 ft. long, on long sheathing petioles. Flowers greenish-white, alternate, short-peduncled on lax, flexuose, horizontal scapes 6-18 in. long, which are thrown out in number of 3-4 close to the ground. Capsule oval, 3-sided, 3-valved, smooth. Seeds numerous, angular, dark.

The cardamom plant grows wild in the Anamallay, Cochin and Travancore forests, and in Kánara, and is also cultivated there as well as in Wynaad, Coorg, etc. There occurs in Ceylon a plant described by some authors as *Elettaria major* which yields a fruit elongated in form and larger in size. This is a mere variety of *E. cardamomum*.

The seeds are used as condiment, a carminative in medicine, and chewed along with areca-nut and betel leaf. It is said that Ceylon cardamom is much used in Russia, Germany, Sweden and Norway for flavouring cakes and for the manufacture of liqueurs.

ORCHIDEÆ.

Eulophia herbacea, Dalz. & Gibs. Bby. Fl. 265.

A small plant with a potato-like root found in the Konkan and Himalaya.

This orchid, *E. campestris*, and probably some others are said to be the source of the best *salep* of India. Dr. Royle believes that *E. vera* yields the best salep of this country.

Food Plants.

There are sold in the bázárs, under the name of *banavatisalem*, an imitation of salep tubers made of wheaten flour. There are also sold another kind of tubers, or rather pseudo-bulbs, under the name of *badassahisalem* the source of which is unknown. It is very cheap and a poor substitute for true salep. There are in Europe and Asia many orchids with tubers more or less large, capable of yielding salep. The following species are some of those which have been actually tried :—*O. maculata* ; *O. saccifera* ; *O. latifolia* ; *O. conopsca*; *O. longieruris* ; *O. ustulata* ; *O. mascula, etc.*

Salep is extensively used as a nutritive substance and a tonic, specially of the sexual organs, though it is very dear. The powdered salep is not easily mixed with water : for preparing a sort of conjee or decoction powdered salep must be first stirred with a little spirit of wine, water must then be added, and the whole boiled. The proportions are—salep one drachm, spirit $1\frac{1}{2}$ drachm, and water half a pint. Natives boil the powder in a large quantity of water till the latter is reduced to half the quantity by evaporation.

Vanilla planifolia, Andr.—*V. aromatica,* Dalz. & Gibs. Bby. Fl. Suppl. 85.

It is a plant striking roots on the trunks of trees on which it is made to climb, with fleshy leaves and large green flowers and obscurely triquetrous pod, size of a small finger.

It is indigenous to the Tierra Caliente of Mexico, but now generally cultivated throughout the tropics of both the New and Old World. In Bombay it was introduced about half a century ago by the late Colonel Jervis. It grows vigorously at Siwri, where it has been re-introduced by a graduate of Grant Medical College, Mr. Furdoonjee, and at Goa by Mr. M. R. de Quadros in his plantation at Sáttári. It has been also introduced on a large scale in the Mauritius, and from 1867 in the French colony of Réunion. For the effects of vanilla which has been made to climb the trunk of *Jatropa curcas*, see the general observations made at the beginning of this chapter.

Vanilla is chiefly used for flavouring chocolate, ices, creams and confectionery in general.

IRIDEÆ.

Crocus sativus, Royle Ill. Himal. Bot. t. 90. *Safran, kessar* or *kecara.*

It is a small beautiful crocus, with a fleshy corm, grassy leaves, purple flower, with 3 large orange-brown stigmas on a thread-like style.

This crocus is supposed to be indigenous to Greece, Asia Minor and perhaps Persia, but is now cultivated throughout the world—Cashmere, China, France, Spain, Austria, United States, etc.

The part used consists of the styles and stigmas which have a powerful aromatic odour, and when rubbed on moistened fingers leave an orange yellow tint. Saffron is extensively used in this country in religious ceremonies and flavouring and colouring sweets, rice, and food in general.

It is believed to be antispasmodic and emmenagogue, and is employed in native medicine. Saffron is also used as condiment in Austria, Germany, some districts of Switzerland, etc. It is said that in Cornwall the practice of colouring cakes and other sweets with it is still prevalent.

Food Plants.

TACCACEÆ.

Tacca pinatifida, Roxb. Fl. Ind. ii. 172.

Root tuberous, often as large as a child's head, round, smooth. Leaves radical, long-petioled, large, 3-partite; divisions pinnatifid down to a narrow wing with irregular acute segments; in fact, they resemble those of *Amorphophalus campanulatus.* Flowers greenish in a dense umbel, subtended by several leafy bracts, and numerous long drooping filiform filaments or barren pedicels. Stamens 6, inserted at the throat of the perianth, with coloured filaments and mushroom-like peltate stigma. Ovary inferior, one-celled, with three parietal placentas. Fruit baccate, globose, as large as a plum.

Grows on Warli and Parel Hills in Bombay, and throughout the Konkan (*see* Grah. Cat. Bby. Pl.); also in the Malay Archipelago. Cultivated at the Mauritius. Roxburgh says that an excellent starch is obtained from the tubers. In Otaheite, where the plant also grows, bread is made of the starch.

DIOSCOREÆ.

Dioscorea sativa, Dalz. & Gibs Bby. Fl. Suppl. 92. *Godri.*

Stem cylindrical, unarmed, twining. Leaves long-petioled, deeply cordate-ovate, membranous, 7-9 nerved, often bearing green globular bulbs in their axils. Male spikes simple or panicled, 1-2 in. long. Flowers very small; female flowers in longer single fascicles. Capsule oblong. Seeds winged at the lower end.

Wild and cultivated in India and the Archipelago; also cultivated in the West Indies, Australia and Mauritius.

D. aculeata, Dalz. & Gibs. Bby. Fl. Suppl. 92. *Kanta, kangia,* or *kangi* (Goa); *botat* of the Bombay bázárs.

Tuber oblong, about 4-5 in. long and 2 in. in circumference. Stem terete, armed, twining. Leaves alternate, cordate, acuminate, 7-9 nerved. Male flowers whitish panicled; female in simple lax spikes. Capsule very broad.

This yam grows in very good soil to a very large size; white and mealy, and is much appreciated.

D. alata, Roxb. Fl. Ind. ii. 797. *Kam-alu, yam* of the English.

Stem 4-winged or angular, twining. Leaves opposite, deeply-cordate-ovate, or cordate-oblong, devoid of pellucid lines, 9-nerved; the exterior pair united; petiole slightly winged. Male and female flowers in compound spikes. Capsule leathery, elliptical. Seed winged.

Wild in the Konkan, and cultivated throughout India, West Indies, etc. Tubers oblong and white; much esteemed. Said to be among yams the second best.

D. globosa, Dalz. & Gibs. Bby. Fl. Suppl. 92. *Chopri-alu, safed kan-phal.*

Stem twining, 6-winged. Leaves alternate and opposite, cordate, sagitate. Flowers whitish; male in long compound spikes; female in simple spikes.

Native of Bengal and cultivated throughout India. Tubers round, white, most esteemed of all yams amongst both natives and Europeans.

Food Plants.

D. oppositifolia, Dalz. & Gibs. Bby. Fl. 247. *Mar-paspoli.*

Stem round, smooth, glabrous, twining. Leaves petioled, mostly opposite, oval-oblong or lanceolate, acute, waved, 3-7-nerved. Flowers distant, male in axillary clustered or panicled spikes; female, few, distant, in simple racemes. Capsule 3-winged. Seeds also winged all round.

Common on the Bombay ghâts and throughout India, Kassia, Ceylon and China. The tuberous roots are eaten by the natives of this country.

D. pentaphylla, Dalz. & Gibs. Bby. Fl. 247. *Ulsi, kanta-alu.*

Stem furrowed, prickly; prickles twin. Leaves digitate 5-divided, membranous; segments oblong-acuminate, cuspidate. Male flowers numerous, greenish-white and very fragrant, female flowers in short axillary twin simple spikes.

Common in the Konkan, on the ghâts and throughout India. Tuber rather large, oblong and white; esteemed by the natives as wholesome and palatable. The male flowers are also eaten, and said to be wholesome; they are sold in the bázár during the rainy season.

D. bulbifera, Dalz. & Gibs. Bby. Fl. 247 under the name of *Helmia bulbifera. Hadu-karanda.*

Stem round, smooth. Leaves alternate, scattered, cordate-ovate, or sub-rotund, membranaceous, cuspidate, glabrous, 9-nerved, bearing in the axils brown, globose, scabrous bulbs; male spikes axillary, simple, about 5 together, or compound panicled; female spikes about 3 together longer than the leaves. Capsule oblong, smooth.

Common in this Presidency. Both the tuber and the bulb are eaten.

All plants of the yam tribe contain an acrid bitter principle, but this is reduced to a minimum under cultivation. After undergoing the process of roasting, steeping in cold water, and boiling, both the tubers and the bulbs become eatable. The best mode of cooking *yams* is, after the tuber has been boiled, to cover it with hot ashes for half an hour or more. Natives of this country steep the tubers, cut into slices in cold water, and then boil and cook them with various spices and other vegetable.

LILIACEÆ.

Smilax ovalifolia, Dalz. & Gibs. Bby. Fl. 246. *Guti wail.*

A large prickly climber with orbicular or ovate-lanceolate leaves, 5-8 in. long and 5-7 nerved, and numerous umbels of flowers.

Common in the Konkan and Deccan. The tender shoots are eaten as a vegetable by the people at Mahábaleshvar.

Allium cepa, Dalz. & Gibs. Bby. Fl. Suppl. 92. *Common onion, piaj* (Hind.), *kandá* (Bomb.)

The bulb eaten as a vegetable and as garnish.

A. sativum, Dalz. & Gibs. Bby. Fl. Suppl. 92. *Common garlic, lassún.*

Cultivated throughout India; in this Presidency in the irrigated lands of the Konkan and Deccan. The root consists of several small what are called cloves, which are used as condiment.

Food Plants.

A. porrum, Dalz. & Gibs. Bby. Fl. Suppl. 92.

This is not much cultivated in this Presidency.

Asparagus officinalis. *Common asparagus, chard, nagdown, haliyun.*

The young shoots eaten; said to be inferior in taste to what is grown in Europe. Hakims use the fruit as a tonic and diuretic.

Asparagopsis sarmentosa, Dalz. & Gibs. Bby. Fl. 246. *Catavari, satavari.*

Root oblong, fleshy, tuberous. Stem much branched, climbing, armed with small recurved prickles; branches grooved. Leaves narrow linear. Flowers small, white in racemes. Berries red when ripe. Wild and cultivated in gardens.

It is largely used in native medicine as a nervine tonic said to be efficacious in the debility of the seminal organs and in pulmonary consumption.

Phalangium tuberosum, Dalz. & Gibs. Bby. Fl. 251. *Kuli.*

This is a small plant, springing up at the beginning of the rains in the Konkan and Deccan with numerous roots, each terminated by an oblong tuber and white flowers in racemes or panicles.

The whole herb is eaten; it is sold in the bázárs. The tubers are also edible.

BROMELIACEÆ.

Ananassa sativa. Described in Dalz. & Gibs. Bby. Fl. Suppl. 94 as *Bromelia ananas. Common pine-apple, annanas* (Bomb.)

Naturalized in several parts of India from a remote period, and much esteemed for its delicious fruit, of which there are several varieties. To make the pine-apple ripen sooner, the crown should be plucked out, which also adds to the flavour.

PALMÆ.

Cocos nucifera, Dalz. & Gibs. Bby. Fl. 279. *Cocoa-palm, mahad, narel.*

The nut is used in various ways. The kernel, which is enveloped by a hard shell, enters into nearly all culinary preparations, such as curries, sweetmeats, etc. The cabbage or tender leaf when boiled is a delicate vegetable. It is also eaten raw, pickled, or made into conserve.

Borassus flabelliformis, Dalz. & Gibs. Bby. Fl. 278. *Palmyra palm, tad, tadi.*

This palm yields a large black fruit containing a gelatinous pellucid pulp called *tad-gollah* in Bombay about the size of an ordinary orange, sometimes larger. The unripe fruit is sometimes pickled, and makes a good conserve. The tender leaf is a good vegetable. The fusiform roots are also eaten by very poor people. Young plants, 2-3 months old, are sold in Bombay under the name of *tárla,* and form an important article of food. (*See* Brandis about the manufacture of sugar.)

Phœnix sylvestris, Dalz. & Gibs. Bby. Fl. 278. *Wild date palm, kajuri.* Food Plants.

Leaf bud or cabbage and ripe yellow fruit are eaten. The tree is common in Gujarát, Konkan, Bengal and Madras, and is highly esteemed on account of its juice called *toddy*. This is extracted by removing the lower leaves with their sheaths and cutting a notch into the pith of the tree near the top. The juice issuing from this notch is conducted by a small palm-leaf channel into an earthen vessel placed to receive it. Toddy is abundantly used by the natives as a cooling beverage, being sweet and like the water from a tender cocoanut; it is converted by a process of boiling into sugar, or distilled after allowing it to ferment into a kind of inferior spirit called *arak*. The tree begins to yield toddy towards the age of 7-10 years, the trunk being then about 4 ft. high, and continues to do so for about 25 years. The juice is extracted from November to February, each tree yielding during that period 180 pints on an average. Twelve pints of toddy can be converted into one of jaggri, and 4 of this into a pound of sugar, so that each tree produces annually between 7-8 lbs. of sugar, which being inferior in quality to cane-sugar sells usually for three-fourths the price of the latter.*

P. dactylifera, Roxb. Fl. Ind. iii. 786. *Date palm, kajúr.* The fruit *tamara, rajib, nakel, kurma, chuara.*

This is the common date palm. Is very high, attaining 100-120 ft. Indigenous to the lower part of the Euphrates and Tigris, Dooab, Arabia, Syria and Palestine, and the great African Sahara. It is now cultivated in Spain, Italy and Greece. In India it is cultivated but sparsely ; it is, however, self-sown in Sind, Multán, Muzaffurgurh, Bundelkund, etc.

The ripe fruit forms an important article of food of the people of Arabia, Palestine, etc., and is largely consumed in Bombay, where it is known by the name of *tamara*. In Sind it is called *khurma* when collected ripe, and *chuwarar* or *chuárá* where removed before it is fully ripe and boiled and dried in the sun. In the Punjáb the produce of the best palm is named *chirni* ; this is usually split in the middle and dried in the sun, The inferior varieties are named *pind* and *bujri*. The large, tender, succulent head of the palm, named *guddah*, *gari* or *galli*, is also eaten like cabbage. Indian dates are smaller and less sweet than those imported from Arabia.

Areca catechu, Dalz. & Gibs. Bby. Fl. Suppl. 95. *Betel-nut, areca palm, mádi, phopali* (Goa and Southern Konkan).

This palm is extensively cultivated in low shady land in Goa, Kánara and Sunda for the sake of its fruit called *suppari*, which is exported to other parts of India. The kernel is chewed with *betel-leaf, chunam* and *cardamoms.*

* See *Ph. sylvestris* in the next section.

Food Plants.

AROIDEÆ.

Colocasia antiquorum, Schot. Milit. i. 18. *Kachu? alu, terent.*

Stemless. Leaves radical, more or less peltate-ovate, shortly acute at the apex, cordate at the base, with a broad sinus, often above 1 ft. long; primary veins about 4-5 on each side of the mid-rib, pedate at the base of the leaf. The tube or convolute base of the spathe ovoid-oblong, usually about 1½ in. long, neutral portion shorter or nearly equal; the male portion almost twice longer; the terminal appendage acute, varying in length or obsolete. Stigmas sub-sessile.

This excellent *arum* varies in the size of its leaves, and the length of its spathes, spadices and appendage. Is endemic in India, but cultivated throughout the tropical and sub-tropical regions of both worlds, in India, Spain, Portugal, Meridional Italy, Sicily, Greece, Creta and Cyprus, Egypt and tropical America. It is described under various names—*Arum colocasia, A. esculentus, Alocasia illustris, Colocasia Acres, C. Tontanesii.* The common variety found in India is the one described by Roxburgh under the name of *Arum nyphæfolium.* He says: "I doubt if this can be reckoned anything more than a large aquatic variety of *colocasia.* In Bengal it is rarely cultivated, but found wild in abundance on the borders of the lakes and pools of fresh water. Every part of this plant is eaten by the Hindus. The root or rather the subterraneous stem often grows to the length and thickness of a man's arm. The petioles, scapes and leaves are of a reddish colour, and the plants considerably larger than any of the varieties of *colocasia* just mentioned, yet the leaves are narrow in proportion to their breadth. The only good specific mark to know it from *colocasia* by, is the shortness of the club of the spadix. Every part of this plant, variously prepared, is eaten."

Amorphophallus campanulatus, Dalz. & Gibs. Bby. Fl. 259. *Suran.*

Root tuberous, spheroid, as large as a cocoanut, covered with dark-brown skin externally. Leaves radical, few; lamina 3-fid, lateral divisions dichotomous, the central and the secondary lateral ones pinnatifid; segments obliquely-oblong, acuminate, unequal; petiole round, smooth or verrucose, light green with dark-green spots. Spathe large, leathery, convolute, infundibuliform at the base, membranaceous and patulous at the upper portion, purplish towards the curved and undulating margin. Spadix about as long as the spathe; female portion cylindric, male ob-conic, a little shorter than the female; appendage dark-purple, conical or sub-conical, lobate, rugose, sinuose. Flowers appear long after the leaves.

Wild on the banks of the streams in the Konkan and various other parts of India, Ceylon, Sumatra, Java, Moluccas, Timor, New Guinea, Taiti. Cultivated throughout India for the sake of its tuber, which affords good wholesome food to millions of this country. It contains an acrid principle which is removed by steeping the sliced tuber for a sufficient length of time in water.

Pinellia tuberifera, Schot. Prod. A. 20.

Under the name of *ziravandmudhiraj* there are sold in all the bázárs in India small tubers of various sizes, from a pea to a betel-

nut, round or depresso-globose, light reddish colour. These arise from the inferior third of the petiole of the above plant which is indigenous in China and Japan. They are starchy, and possess nutritive properties. They are sold here in India as the produce of *Aristolochia rotunda* with which they have nothing to do.

Typhonium bulbiferum, Dalz. & Gibs. Bby. Fl. 258.

Growing in the Konkan and Malabar, and *Amorphophallus bulbiferous,* described by Roxburgh under the name of *Arun bulbifera,* indigenous to Bengal also yield bulbs, but they are not stated to be edible.

THYPHINÆ.

Typha elephantina, Roxb. Fl. Ind. iii. 366. *Elephant grass, rambán,* or *rámbana* (the arrows of Rám).

A large, reed-like, marsh and aquatic plant. Stem smooth, round, 6-12 ft. high. Leaves linear, ensiform, smooth, 4-6 ft. long, ¾ in. broad, parallel veined, sheathing at the base. Flowers unisexual, very closely packed in separate spikes; the upper spike terminal, cylindric, about a foot long and 1 in. in circumference, 2-3 in. above the female spike; anthers yellow with green top, which gives to the spike a greenish appearance; filaments filiform surrounded by very thin hair. Female spike about as long and thick as the male. Each ovary is surrounded by a calyx consisting of fine capillary hairs. Fruit oblong, one-seeded.

Grows on the margins of tanks and slow-running rivers in the Konkan and Deccan. It is said that *buri-bread* is made in Sind from the pollen of this plant. Elephants are very fond of the leaves; they are also used for thatch by the poor people.

It is called *pauna-grass* in Sind, and is of great importance for binding the soil on the banks of the Indus with its long tortuous roots of which great care is taken when the culms are cut down to make matting of. They are tied in bundles and used like sedges *(Spargium ramosum)* in England as buoys to swim with.—Grah. Cat. Bby. Fl.

ALISMACEÆ.

Aponogeton monostachyum, Dalz. & Gibs. Bby. Fl. 248; Roxb. Cor. Pl. t. 81.

Root bulb-like tuber, covered with the remains of the old leaves and emitting fine roots from the base. Leaves radical, mostly submerged, long-petioled, linear, oblong, or lanceolate, acuminate or obtuse at the apex, cordate or round at the base, entire, smooth, 3-7-nerved, 3-6 in. long, ½-¾ in. broad; scape as long as the leaves. Flowers hexandrous in densely packed terminal spikes. Perianth segments of 2 obovate, concave, membranous divisions. Fruit ovoid, smooth, tapering into a short, recurved point, 1-celled, 2-8 seeded.

In the tanks of the Dhárwár and Belgaum districts and throughout India. The tubers are starchy, and eaten as a vegetable.

Food Plants.

CYPERACEÆ.

Scirpus kysoor, Dalz. & Gibs. Bby. Fl. 288. *Kacherá.*

Root tuberous, size of areca-nut. Culm 5-6 ft. high, triangular hispid. Leaves broad-linear, acuminate, sheathing at the base as long as the culm. Umbil supra decompound, many-flowered, erect, leaflets of the involucre from a few inches to 1-2 ft. long. Spikes brown-coloured. Fruit oblong, bristles 5, oblong.

Common in Sálsette and Thána and throughout India, on the margins of tanks and rivers. The tuber is sold in Bombay, and is eaten by all classes here, in Sálsette, Ahmadabad, etc. It is sweet and starchy.

GRAMINEÆ.

Paspalum scrobiculatum, Dalz. & Gibs. Bby. Fl. Suppl. 97. *Kodra, kodri, harick.*

Root fibrous, culm tufted, 2-3 ft. high; nodes 3-4, glabrous, brown. Leaves bifarious, smooth. Sheaths terete, nearly as long or longer than the internodes. Spikes usually 2-4 alternate, 1-4 in. long. Rachis flat-keeled. Spikelets shortly-pedicellate, or sessile, imbricate, glabrous in 2 rows, ovoid, orbicular, flat.

Wild and cultivated in the tropical regions of the Old World. In India it is chiefly sown in the mountains, dry barren regions, and the grain forms the food of the poor people. It is said to be as palatable as rice, but occasionally it induces symptoms of intoxication like those caused by the seeds of datura. For further information see remarks at the beginning of this chapter.

Panicum miliaceum, Dalz. & Gibs. Bby. Fl. Suppl. 98. *Small-millet, wadi, sawa, chenah, sama, varika, unu.*

Culm erect, much tufted, very hairy, 2-4 ft. high. Leaves broad, very hairy, sheathless. Panicles nodding, much divided. Spikelets numerous, very small, ovoid, pedicellate. Fruiting glume (palca) smooth and shining, the outer glume acute, 3-nerved, the next two glumes broad, 7-11-nerved, acute. This is the common millet cultivated throughout India over the gháts and the Mediterranean coast.

Panicum (Setaria) Italicum, Dalz. & Gibs. Bby. Fl. Suppl. 98. *Kangu, kángni, rala, rawla, bertia, kakun, keranj, kerakang, chena, kora* (Dec., Hind. and Beng.)

Culm tufted, erect, smooth, round, 3-5 ft. high. Leaves very broad, hispid, sheaths hairy at the mouth. Panicle much branched, cylindrical, stout, at length nodding at the summit; branches usually contiguous, oblong. Fertile floret minutely dotted at length smooth. Bristles at the insertion of the spikelet 1-3 roughened upwards, usually much exceeding it.

Cultivated throughout the hilly parts of India and other tropical regions. This is the Italian millet of the Europeans.

P. frumentaceum, Dalz. & Gibs. Bby. Fl. Suppl. 98. *Shamula, kathi, kangra, sawa, sanwa, saon, shama* (Dec., Hind. and Beng.)

Culm erect, 2-4 ft. high, flattish, smooth. Leaves large with hispid margins. Panicle erect, oblong, nodding; spikes numerous, secund, incurved, occasionally verticelled. Rachis angular, sparingly hairy. Flowers almost always 3 from the same point, unequally pedicelled. Glumes 3-nerved, the two large empty glumes with shorter awn than the lowest glume; the flowering glume awnless. Fruit ovoid, pointed. **Food Plants.**

Wild and cultivated through India in and near the ghàts and also in Africa. The grain is said to be wholesome and nutritious and is used chiefly by poor people inhabiting the hills. Cattle is said to be very fond of it.

P. pilosum, Dalz. & Gibs. Bby. Fl. Suppl. 98. *Arzan, bhadli.*

Erect or ascending, pilose, bearded at the nodes and mouth of the sheaths. Leaves lanceolate or linear acuminate, round at the base. Panicle spreading; rachis pilose with scattered hairs; branches numerous. Spikelet ovate, glabrous. Empty glumes 3-5-nerved. Fertile flowers ovate, pointed, smooth. This small plant is also cultivated over the ghàts.

There are other grains sold in the bázárs of India named *mella-shama, nella-shamalu, barti, danlig, rali, shallu, sundia, kunki,* the botanical sources of which are not ascertained. They are supposed to be varieties of the millets already described.

Millet grain is largely used in India, China, Africa and in some parts of Europe. It is said to be very nutritious. Parkes says that "millet bread is very good, and some was issued to the troops in the last China expedition. This should always be done in a millet country if wheat or barley cannot be obtained. In Northern China millet is almost exclusively used."

These observations are equally applicable to bájri, jowári and náchni, which are also included by European authors under the name of millet.

Penicillaria spicata, Wild. described in Dalz. & Gibs, Bby. Fl. Suppl. 98 under the name of *Holcus spicatus. Bájri, bajera, bajra, sazgaran.*

This is extensively cultivated in Khándesh, Gujarát, Deccan and throughout India and Africa. It does not grow in the Konkan and other low lands, but the grain is largely imported there and used by the poor people instead of rice, which costs them more.

Saccharum officinarum, Dalz. & Gibs. Bby. Fl. Suppl. 99.

This useful plant is cultivated thoughout the tropics of both hemispheres. The varieties introduced in Bombay are numerous; the chief are—

1. The large yellow or Mauritius cane.
2. The common red.
3. The Bamani or striped red and white.
4. The small white or reed cane.
5. The black Egyptian variety. This is quite equal to the Mauritius variety, but has disappeared.

Food Plants

This is the tallest bambu, attaining a height of 30-50 ft. and a diameter of 4-8 in. Culm green, shining and spinescent. Grows in Poona, Malabár, etc.

B. vulgaris, Dalz. & Gibs. Bby. Fl. 299. *Kalaka* or *bambu.*

Culm unarmed, 20-50 ft. high, green or greenish-yellow. Cultivated in Sátára and various parts of India.

Dendrocalamus strictus, Brand. For. Fl. 569.—*Bambusa stricta*, Dalz. & Gibs. Bby. Fl. 299. *Bans, bas, bassa, vassa.*

Culm armed or unarmed, straight, strong and elastic, with a small cavity or none; attains 20-40 ft. in height. Common throughout India.

Arundinaria Wightiana, Brand. For. Fl. 562.—*Bambusa arundo*, Dalz. & Gibs. Bby. Fl. 299. *Chevari.*

It is a small thorny bambu 6 to 12 ft. high; grows at higher ghâts. Walking sticks are made out of this for sale at Mahábaleshvar.

Bambus flower once in about 30 to 32 years, and when such an occurrence takes place the whole tract extending over many miles is in full flower; it sometimes happens, however, that only a few bambus of a cluster flower each year, when the flowering goes on every succeeding year with the other bambus of the cluster. The variety *Arundinaria Wightiana*, however, flowers and dies down annually, when new shoots spring up from the roots and attain their full size in a single season. Both in this variety and in others, the flowering is followed by the death of the stems, so that after seasons of general flowering a whole district presents for some time the spectacle of a large forest of dried up clumps. The product of the flowering of the bambu is a rice which is consumed by the poorer people in lieu of common rice. A very palatable bread is said to be made of the flour of this rice, although the colour of it is somewhat dark.

In the scarcity of 1812 in Orissa, of 1864 in Kánara, and of 1866 in Malda this rice formed the principal article of the food of the poor population: hence perhaps the belief, entertained by some Government officials, that the bambu only flowers in seasons of general scarcity.

From the young tender bambu shoots pickle and preserves are made which are considered very palatable by the natives. The sliced shoots are also made into dishes.

There are other uses to which the bambu is put. Of the *Bambusa arundinacea*, which attains a height of from 60 to 80 ft. and a diameter of 6 to 8 in. and is by far the most important of the several varieties, many uses are made. It supplies poles for carrying purposes, tents, scaffolding, timber rafts, &c., and is used, besides, in the manufacture of furniture and for ladders, fencing, mats, baskets, fishing rods, window and door blinds and for many other useful purposes. The next in importance is the *Dendrocalamus strictus*, which grows from 20 to 40 ft. All this growth is attained in a single season. This bambu is solid and elastic, and is much

used for roofing purposes and making shafts for spears, besides several of the purposes mentioned previously. Mr. Lethbridge says that all the varieties of bambus are capable of being employed in the manufacture of paper.

Food Plants.

Triticum æstivum, Dalz. & Gibs. Bby. Fl. Suppl. 97. *Gium, ghawn, mar-ghum, ghawut-ghum.*

This is the common wheat cultivated throughout India. It does not grow below the ghâts, as neither the soil nor climate suit it. There are several varieties known in the Presidency, such as *kaple, baksi*, etc. Both these are sown in irrigated lands; that which is raised in higher ghâts is said to be proportionally heavier than that raised in the plains. The Indian wheat produced in Northern India is of late largely exported to Europe, where it fetches very good prices.

This grain is an article of diet, and is consumed all over the world; it is rich in nutritive principles and easily digestible. The nitrogenous substances are in large and varied proportions, consisting of soluble albumen (1 to 2 per cent.) and gluten (8 to 12 per cent.). The starchy substances, including sugar, are also in large proportions—60 to 70 per cent., and are easily digested. Wheat, however, is deficient in nutritive fat and salts.

Hordeum hexastychon, Dalz. & Gibs. Bby. Fl. Suppl. 96. *Jow, satu, jab.*

This is the common barley cultivated throughout India in the cold season; alluvial soil suits it best. On this side of India it is much cultivated and consumed in the north of Gujarát and in the Deccan. In the latter place it is said to be also grown as an offering to the gods.

It is very nutritious and like wheat contains a large proportion of nitrogen and other nutritive principles, and the Greeks trained their athletes on it. Dr. Pereira says that it is rather laxative, and hence not suited to such as suffer from relaxation of the bowels. For gruel country raised barley is superior to "pearl" and other kinds imported from Europe, because it is fresh.

"According to Bretschneider barley is included among the five cereals which, it is related in Chinese history, were sowed by the Emperor Shen-nung, who reigned about 2700 B.C.; but it is not one of the five sorts of grain which are used at the ceremony of ploughing and sowing as now annually performed by the emperors of China."

FAMINE PLANTS.

WILD HERBS, TUBERS, etc., USED AS FOOD DURING SEASONS OF SCARCITY.*

NOTWITHSTANDING the efforts made by Government to inquire into and study the various plants used as food by the natives of India during seasons of drought, it is curious to find so many errors in the various reports that have been published on this subject—plants and vegetables that are eaten all the year round in ordinary times being sometimes included in the list of famine foods. The officers who were employed on relief works during the last famine in some districts of the Bombay and Madras Presidencies, having for the first time seen natives using certain wild herbs naturally enough concluded that these were resorted to for want of ordinary food, or, in other words, that they were famine plants. It is a difficult task for a single man, howsoever long he may have resided in this country, to obtain an accurate list of all the food-grains and vegetables eaten by the natives of India during ordinary seasons and those of scarcity. Hence the most intelligent of these officers do not appear to have steered clear of such mistakes, and I particularly remember a certain gentleman who once belonged to the covenanted service of this Presidency and whose goodness of heart led him to constantly mix himself up with and inquire into the wants, habits and customs of the poor natives in the districts he happened to be located, asking me the question "Do the natives eat *tackla (Cassia tora)*? it has such a disagreeable smell." Now the natives use this plant not only during famines, but almost all the year round, specially at the commencement of the rainy season; they also partake of it made into "*shak bāji*" on every Monday of the month *Shrāwan*. The question was, therefore, one that much surprised me, the more so that the gentleman referred to, besides his particular interest in the natives, was himself a botanist. I have compiled a list of fruits and vegetables used by the people of this country which contains names that, I am sure, have never been heard by many Europeans and I will make bold to say by even a large majority of the natives, especially those who live in large towns. It is a fact, however, that even well-to-do natives eat some of the wild herbs found in or about their villages, either as a change, or as an addition to their meals, or when a supply of good cultivated vegetables is not procurable; nay many of them make a point to use, at least once a year, made into *shak bāji*, herbs and tubers usually eaten by the humbler classes, whether cultivated or uncultivated,

* This paper was read at one of the meetings of the Bombay Branch Royal Asiatic Society.

which appear successively in each season of the year, under the belief that such a proceeding assists in warding off the various causes of disease. Famine Plants.

It is to be regretted that we have no chemical analysis of the various food-grains and vegetables eaten by the natives, nor is there any reliable information as to the knowledge which guides them in the selection of one species and the rejection of others, though all belonging to the same genus and order. This knowledge is perhaps the result of the accumulated experience of bygone generations. Afflicted by periodical droughts, subjected to persecutions by native princes whose armies plundered their fields during the intestine wars which were in past times very frequent, the people were driven from home to distant secluded places and hills for shelter and refuge. Here they must have learnt, from want of their ordinary food, to use various herbs, and must also have acquired the knowledge of the fact that the seedlings and tender stalks of almost every plant are wholesome; nay that even poisonous roots and tubers, if properly boiled, may be eaten with impunity.

Almost all the species of plants belonging to the order *Aroideæ* are more or less poisonous: some, like *Lagenandra toxicana—Vatsumb* of the Maráthás, etc., are deadly poisonous. They contain an acrid principle which is said to be destroyed by the application of heat, or by the mere drying of the aroids. During the late famine in Madras and the Southern Marátha Country thousands of people were seen to live upon tuberous roots and leaves of some aroids known to be poisonous. It is believed that the boiling or stewing process these herbs were subjected to prior to being eaten, destroyed their deleterious principle, and thus the tubers, etc., became innocuous, or rather wholesome food. With the exception of these the plants in the list below contain neither acrid nor poisonous principles; nay many of them are, I believe, used at all times of the year, though in small quantity, mixed with other food; but are they all equally nutritious? Cultivated pulses are known to be very nutritious, some of them coming up, in the quantity of nutrient principles they possess, to the best cereals. In the late famine people were seen at Kaládgi, Sholápur, Ahmednagar and elsewhere to use the seeds of *Abutilon muticum, Indigofera linifolia, I. cordifolia, I. glandulosa, Alysicarpus rugosus*, etc., which were ground and made into cakes or conjee either alone or mixed with the flour of *bájri*. The analysis of Surgeon-Major Lyon has shown that all these seeds contain a large quantity of nitrogenous and carbonaceous principles,—some quite as much as the best of cultivated pulses,—in fact, it would appear that cultivation increases the cellulose of certain pulses at the expense of their nitrogen. But it does not follow from this that the wild grains above mentioned are easy of digestion, for it was a common complaint that the people who had lived on them alone had become lean, and weak, and suffered from bowel disorders, due perhaps to the fact that large quantities had to be eaten to satisfy the wants of the system, which could not be digested. And if these were the results of eating such pulses as were just referred to, it is not difficult to imagine what results would follow upon the prolonged use of such gritty grain as that of *Tribulus terrestris, Cyanotis axillaris*, and others which, although containing a fair proportion of nitrogenous principles, cannot be easily assimilated.

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In order that a substance, vegetable or animal, may be wholesome or useful as an article of food, it is necessary that it should contain principles, nitrogenous and carbonaceous, in due proportion, and in such a state of combination that they may be easily separated, disintegrated and digested in the stomach. It is a fact that many of the plants in the list given below contain less of nutritive principles and more of woody tissue, gummy and resinous substances and various extractive matters which are neither digestible nor nourishing; they may be palatable to the taste and temporarily appease the craving of hunger, but their exclusive use for a lengthened period brings on decay and emaciation, and renders the constitution an easy prey to disease. This assertion is not based on theory alone. Numerous facts observed during the famines in Orissa, Behar, Madras and Southern Marátha Country prove that the protracted use of such herbs alone, even of *tackla, muchur,* etc., which are used in ordinary seasons in small quantities along with other food, was followed by emaciation and other symptoms of slow starvation such as anæmia, scurvy, etc., often proving fatal by inducing diarrhœa, dysentery, dropsy of the whole body, or of the abdomen alone.

Man whether asleep or awake, whether in a state of rest or actively engaged in the multifarious duties of life, is perpetually undergoing an imperceptibly slow process of disintegration. To put it clearer, every action in his life, from the involuntary one of breathing to that which demands the largest amount of physical or mental energy, causes the waste of a certain amount of muscular and nervous substance in the shape of nitrogen and carbon which exist in the various organs and tissues of the body and the loss of which has to be made up by food. It has been calculated by eminent authorities that a healthy adult excretes as much as 140 to 180 grains of nitrogen a day when at rest, the proportion of carbon excreted being placed by some at 4 and by others at as much as 7 times the quantity of nitrogen. In ordinary labour about 300 grains of nitrogen are excreted, the quantity lost under great physical exertion of many consecutive hours reaching as much as 5 to 600 grains. It is upon a knowledge of these facts that the dietaries of jails, hospitals, barracks and like establishments are based; for it is clear that, unless the quantity of food taken in contains enough of nitrogen and carbon to make up for the waste the body has undergone, the latter must prey upon itself so long as there is anything left to prey upon, and then die. This is exactly what happens when the food taken into the body is deficient either in quantity or in the elements that compose it. The diets of our jails are calculated to provide 200 to 300 grains of nitrogen daily, and care is taken to supplement these when necessary by meat, vegetables, &c., to prevent the body falling into a low condition incompatible with the exertion it has to undergo. The staple-food of the natives in India is rice, which contains between 70 to 80 grains of nitrogen per pound. An ordinary labourer would, therefore, require about 3 pounds per day of rice to keep his body at its working standard. Any great deduction from this quantity might perhaps suffice to maintain a state of feeble vitality for a certain length of time, but it admits of no doubt that before long the system begins to suffer the effects of starvation. This was well exemplified by the effects of what is now

historically known as the one-pound ration of Sir Richard Temple during the famine of 1876-78. Such as were strong enough to resist the immediate effects of hunger for some time, even when afterwards well fed and taken care of, were found to be suffering from diarrhœa, dropsy, &c., from which nothing subsequently cured them, the tissues engaged on the process of assimilating food having from lack of sufficient nourishment undergone a degenerative process which unfitted them for their work.

There is another way in which the wild herbs and tubers mentioned below are said to affect injuriously those who eat them. In the presidential address delivered before the Grant College Medical Society in 1878, in speaking of the causes of leprosy, I said the following :—" Some attribute it to deficiency of salt in the food of the poor people of this country, and to the use of *dall*. The proportion of common salt existing in the blood is very great, and absolutely necessary for the due performance of various vital processes. The experiments made by Boussingault show that the addition of salt to the fodder of animals has no influence in the quantity of flesh, fat, or milk obtained from them, but it appears to have a favourable effect on the appearance and quality of the stock. After detailing his experiments he says :—'The hair in the oxen which had got salt was smooth and shining; that of the other which had no salt added to their fodder, was matted, and the skin here and there devoid of hairs. Those of the first lot, on the contrary, retained the look of stall-fed beasts; their liveliness and frequent indication of a desire to leap contrasted strikingly against the heavy and cold temperament observed in those of the second lot. There is no doubt'—continues Boussingault—'that a higher price would have been obtained in the market for the oxen reared under the influence of salt.' Baron von Leibig (from whose Letters on Chemistry the above extract is taken,) after remarking how the constitution is lowered by deficiency of salt in food and thus becomes liable to be easily attacked by various morbific agents, says: 'Many agriculturists have, however, drawn very different conclusions from these experiments (Boussingault's). As addition of salt yields to them (the farmers) no profit, since by the outlay in salt nothing is gained in flesh, they conclude that salt is of no use whatever; nay these experiments have actually been abused as proofs and arguments against the reduction of the *impost on salt*,—of all taxes on the Continent that which is the most odious, the most unnatural, and the most disgraceful to human nature. We may here see that more wisdom is displayed in the instinct of an ox, or a sheep, than in the arrangement of him, who, strange to tell, often regards himself as the image of Him who is the perfection of all kindness and of all reason.' You all know that the high tax on salt imposed by the Indian Government falls chiefly and heavily on the poor population. The Government is desirous of abolishing or reducing it, and we must hope that the time of its remission will soon arrive. The poor population of India generally uses as articles of food various wild and uncultivated herbs mixed with cultivated grain and pulses; but during scarcity and famine it lives entirely on the former. In this kind of food some find the cause of leprosy. I have examined all the wild vegetables said by the Government officers to be used by the poor natives, and have

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found that the greater number of them must be of easy digestion and all innocuous; but it remains to be ascertained if the prolonged use of these substances can exercise any influence in engendering some morbid state of constitution; and if in times of scarcity good legumes are mixed with diseased grain, etc. It is a fact that all pot herbs, grains, pulses and tubers contain less salt: for example, potatoes and spinach cannot be eaten without salt; perhaps uncultivated leguminous vegetables, which by themselves are innocuous when eaten for a long period without being seasoned with a proper quantity of salt, may lead to deterioration of the nutrient fluid of the human body, ending ultimately in the production of the disease. Dall, good or diseased, may be noxious for the same reasons. This opinion does not appear, however, to have been based upon well-observed facts.

The following list, collected some four years ago is now with a few additions and corrections, brought before the Society, in the hope that it may not be deemed to be wholly uninteresting and that it may be useful in inducing such of the members as have opportunities of adding to it; for besides the plants below mentioned, there are many others which famine-stricken people make use of,—in fact, it would appear that they devour whatever more or less tender vegetable substances they come across, provided they are not either very acrid or bitter."

POLYGALEÆ.

Polygala chinensis, Hooker Fl. of Brit. Ind. i. 204.—*P. arvensis*, Roxb. Fl. Ind. iii. 218; Dalz. & Gibs. Bby. Fl. 12. *Negli* (Mar. and Hind.)

An annual diffuse leafy plant 3-10 in. high. Leaves orbicular or linear. Flowers small, yellow.

It grows in the Konkan, but is common in Sholápur, Poona, and other high dry situations. The young leaves are eaten with salt, chillies, and other condiments. Said to be pleasant to the taste, and perfectly wholesome.

This is one of the herbs sent from the Kaládgi District to the Bombay Secretariat. Its identification, however, is doubtful.

MALVACEÆ.

Abutilon muticum, Hook. Fl. Brit. Ind. i. 327.—*A. tomentosum*, Dalz. & Gibs. Bby. Fl. 18. *Chackrabenda* (Bombay name).

An annual or perennial plant, 4-6 ft. high, with large leaves, tomentose on both sides, large yellow flowers and globose capsules.

Grows at Surat, Poona, Sátára, Kaládgi, Sholápur and throughout India, Ceylon, Afghanistan and tropical Africa. The seeds are said to be highly nutritious. They were ground and made into cakes either alone or mixed with jowári flour. Sometimes they were boiled and drunk in the form of conji.

Hibiscus tiliaceus, Roxb. Fl. Ind. iii. 192.—*Paritium tiliaceum*, Dalz & Gibs. Bby. Fl. 17.

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The bark abounds in mucilage, which is sucked by natives of West Indies in times of scarcity. The inner bark yields excellent fibre which is made into cords, ropes, whips and mats. This plant is cultivated in gardens and is found wild in Ratnágiri and Tiracol and in many other parts of India.

Eriodendron anfractuosum, Dalz. & Gibs. Bby. Fl. 22.—*Bombax pentandrum*, Roxb. Fl. Ind. iii. 165.

A very common prickly tree with palmate leaves and dingy white flowers. Capsule oblong, like cucumber, contains numerous pyriform black seeds. These are roasted and eaten. The cotton surrounding the seeds is only used for stuffing pillows and cushions.

STERCULIACEÆ.

Byettneria herbacea, Roxb. Cor. Pl. 29; Fl. Ind. i. 619; Dalz. & Gibs. Bby. Fl. 23.

A small unarmed herb not uncommon all over the Konkan, Kárnatic and Orissa; pretty common in Bombay during the rains. Its corolla resembles that of *Guazuma tomentosa*, petals yellow outside and red within. Capsule the size of a pea, 5-lobed, and covered with small prickles. Leaves used as a pot herb. I suspect that the plant identified as *Polygula chinensis* is *B. herbacea*

Guazuma tomentosa, Dalz. & Gibs. Bby. Fl. Suppl ii.

A middle-sized tree, widely planted in Bombay and in the warmer parts of India. Capsules 1 in. oblong, covered with obtuse black tubercles, are filled with mucilage which being agreeable to the taste are chewed. The glutinous mucilage of the bruised bark is employed for clarifying sugar. It is often obtained for the purpose by boiling the bark. The wood is light and loose-grained, and is used for furniture and by coach-builders for panels.

TILIACEÆ.

Corchorus trilocularis, Roxb. Fl. Ind. ii. 582; Dalz. & Gibs. Bby. Fl. 25. *Kaunti* (Sans.), *tandlassir* (Kan.)

Annual herb with small yellow flowers and angular and scabrous capsules. It is found in Gujarát, Sholápur and other high dry ranges.

Corchorus olitorius, Roxb. Fl. Ind. ii. 581; Dalz. & Gibs. Bby. Fl. 25. *Jute.*

Very common everywhere. It is eaten as a pot herb in Aleppo and Egypt, but not in India so far as my inquiries go. I am, however, informed that some natives of this country do eat it.

LINEÆ.

Erythroxylon monogynum, Roxb. Cor. Pl. t. 88; Fl. Ind. ii. 449.—*Sethia Indica*, Wight. Ill. t. 48. *Tavadrum, semmenatty, davadgbor.*

This is a large shrub or a small tree; it grows in hilly dry parts of Madras and Ceylon. Leaves and young shoots used as green. They are said to have afforded food to many thousand people dur-

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ing the late famine in Madras. The *Indian Agriculturist*—Edit. Notes, 1877—says thus regarding this plant :—

"This plant belongs to the same genus as the South American which yields the substance called *coca*. "This coca is used as a masticatory by the native races on the Western Coast of South America, and produces a stimulating effect on their nervous system, banishing care, allaying the pangs of hunger, and enabling those under its influence, to endure great fatigue without any other sustenance. The Indian plant is nearly allied to the coca, and possesses some of the specific properties of that plant. It would appear very strange that the famine-stricken natives of India, like their brethren of the new world, should have resorted to this particular plant when there is nothing either in the appearance, taste, or texture of the leaves of the Indian plant likely to induce hungry men and women to eat them in preference to the leaves of any other plant common in the district Experience has, no doubt, taught them that they have the power of mitigating the pangs of hunger and acting as a stimulant."

The virtue of the leaves is due to the presence of an alkaloid *cocaina* which in small doses is strongly stimulating, and produces a feeling of intoxication; in fact, it resembles in its action opium administered in small doses. Dr. Lindley in his Flora Medica, page 200, says that the leaves are "a powerful stimulant of the nervous system, affecting it in a manner analogous to opium. Less violent in its effects than that drug, but more permanent in its action. The Peruvians chew the leaves with finely powdered chalk, and the Government of Potosi alone derived a revenue of as much as 500,000 pesos duros in the year 1583 from their consumption."

The revenue has since increased to a considerable extent. We have no information whether the leaves of the Indian species contain the alkaloid in sufficient proportions to produce similar effects. Observations are wanting in this respect. Probably *cocaina*, if really present, must exist in very small quantity, for people use the leaves and tender stalks as green and not as a masticatory.*

Tribulus terrestris, Dalz. & Gibs Bby. Fl. 45. *Gokhrū.*

It is a small humifuse plant, branches 1-2 ft. long. Flowers yellow. Fruit angular, prickly. Common in Káthiáwár, Gujarát and the Deccan and all over India in hot dry places. The herb is eaten as pot herb. The hard seeds are also gathered and reduced to powder, are eaten baked into bread; but they are indigestible, hard and brittle.

GERANIACEÆ.

Oxalis corniculata, Roxb. Fl. Ind. ii. 457; Dalz. & Gibs. Bby. Fl. 42. *Amru* (Hind. and Beng.), *ambuti* (Dec.)

The leaves of this very common weed are eaten as salad at all times, but much procured in seasons of drought.

MELIACEÆ.

Melia azadirachta, Roxb. Fl. Ind. ii. 394.—*Azadirachta Indica,* Dalz. & Gibs. Bby. Fl. 36. *Nim.*

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* For further information see Pharmaceutical Journal for 1879 and 1880 and Markman's "Peruvian Barks" in which he details his own observations and numerous facts collected from various sources.

The ripe fruits are eaten, as they contain a small quantity of sweetish pulp. Famine Plant

SAPINDACEÆ.

Cardiospermum Halicacabum, Roxb. Fl. Ind. ii. 292; Dalz. & Gibs. Bby. Fl. 34. *Naphatki.*

An annual climbing plant with small white flowers and an inflated mebranaceous capsule. Very common in hedges. Leaves and young shoots eaten as green.

LEGUMINOSÆ.

Rothia trifoliata, Wight. Ic. t. 199.—*Trigonella Indica,* Roxb. Fl. Ind. iii. 389.

A copiously branched annual about a foot or more long. Pods 1½-2 in. long. Found on high dry ranges.

The leaves and pods eaten as vegetable.

Indigofera linifolia, Dalz. & Gibs. Bby. Fl. 58. *Burburra, Pandhari plate, bhangra, torki.*

A small diffused annual with simple linear leaves, bright red flowers and small globose, 1-seeded pods. The whole plant is persistently silvery-hoary.

Common throughout India, Afghanistan, Abyssinia, Australia, etc. During the late famine the seeds of this plant, though unpleasant to the taste, were largely consumed by people of Kaládgi, Dhárwár, Sholápur, Ahmednagar, etc. They were pounded and made into cakes either alone or with some cereals. The analysis made by Dr. Lyon goes to show that this uncultivated pulse is rich in nitrogen. This and several other plants were sent to me for identification by a gentleman from Sholápur.

Indigofera cordifolia, Dalz. & Gibs. Bby. Fl. 58. *Godadi, bodaga, botsaka.*

A much branched annual with cordate leaves, bright red flowers and oval legumes, 1-2-seeded.

Very common throughout Bombay and India in general, Afghanistan, Australia, etc.

The seeds were used by famine-stricken people when other food could not be obtained. They were prepared as those of the last plant, and may be classed, according to the analysis of Dr. Lyon, as a highly nitrogenous pulse.

Indigofera glandulosa, Dalz. & Gibs. Bby. Fl. 58 (note). *Vekhariyo, baragadam* (Tel.)

An annual shrubby species with trifoliate leaves, small red flowers and reflexed 2-seeded legumes. Very common everywhere. The natives make flour of the seeds, and baked into bread use it as an article of diet in times of scarcity. The seeds are also rich in nitrogen.

Sesbania Ægyptiaca, Dalz. & Gibs. Bby. Fl. Suppl. 21. *Sewri.*

A small tree, 8-12 ft. high, of a few years' duration, with 21-41 leaflets, yellow flowers, sometimes more or less tinged with red lines. Pods 6-9 in. long, many-seeded.

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are discarded. The skin is studded with bunches of very fine downy spines which the Indians brush off with a bunch of grass. * * *". "The dry unripe fruit" is "cooked with meat and other substances. The fresh unripe fruit" is often boiled in water from ten to twelve hours until soft, when it becomes like apple sauce; then being allowed to ferment a little it becomes stimulating and nutritious. Some Indians roast the leaves of the '*Opuntia*' in hot ashes, and when cooked, the outer skin with the thorns is easily removed leaving a slimy, sweet, succulent substance which is eaten, etc."

CUCURBITACEÆ.

Rhynchocarpa fœtida, Hook Fl. Brit. Ind. ii. 627.—*Æchmandra rostrata*, Dalz. & Gibs. Bby. Fl. 100.

This fœtid climbing cucurbit grows in Bombay, the Deccan and Gujarát. Fruit and leaves are eaten. Fruit bright red when ripe, 2-celled.

FICOIDEÆ.

Trianthema pentandra, D. C. Prod. iii. 352.

Is a small prostrate plant, common in the Punjáb, Sind and plains of North-West India. Leaves and tender shoots are boiled and eaten as green.

Orygia decumbens, Hook. Fl. Brit. Ind. ii. 661.

This wild herb grows in dry places in the Deccan; also from the Punjáb and Sind to Mysore and Coimbatore. The leaves eaten as vegetable.

Gizekia pharnecioides, Hook. Fl. Brit. Ind. ii. 664; Roxb. Cor. Pl. t. 183.

A small diffused herb, 8-18 in. long. Grows in the Southern Deccan, Peninsula, Konkan and other hot and dry places.

Used as a pot herb.

RUBIACEÆ.

Morinda citrifolia, Dalz. & Gibs. Bby. Fl. 114. *Al* or *aal*, *bartundi*.

Common. The green fruits are used in curries; the riper ones are also eaten.

Morinda umbellata. *Al. (?)*

Cultivated on this side for the sake of the bark of the root, which is used for dyeing red and yellow. The green fruits are used in curries and the ripe ones eaten.

COMPOSITÆ.

Glossocardi Boswellia, Dalz. & Gibs. Bby. Fl. 129. *Pithari* (Sans.), *pitpapra*, *phathursuwa*.

This is a weed found in dry soil. Very common in Poona and other places. The leaf is said to be eaten in ordinary years as vegetable and is believed to be perfectly wholesome. This plant

was sent from Kaládgi, and identified by Dr. Gray. The identification is, however, doubtful; for the flowers of *Glossocardia* are yellow, and not rose-coloured, as stated in the printed list of the Bombay Secretariat. The specimens sent from Kaládgi with the above native names belong probably to *Cyathoclyne stricta*, the flowers of which are purple, and the leaves deeply cut.

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SAPOTACEÆ.

Bassia latifolia, Dalz. & Gibs. Bby. Fl. 139; Roxb. Cor. Pl. t. 19.

Both the ripe and the unripe fruit are eaten by the natives, but perhaps the most important product of this plant is the flower, of which 200 to 400 lbs. are sometimes collected from a single tree. These flowers are always gathered early in the morning, dried in the sun, and then sold as an article of food, being consumed either raw or cooked along with parched grain. Many of those who have gone to Mátherán must have seen the natives at the foot of this hill collecting the flowers of the *mowah* which are much esteemed by them; and, indeed, during the famine of 1873-74 at Behár they are said to have kept thousands of people from starvation. They have a sweetish smell and taste.

The seeds of the *mowah* yield by expression a greenish-yellow oil which is used by unscrupulous dealers for adulterating ghee. It is also used in making soap in Kaira. The oil-cake is employed for poisoning fish and to kill rats, and when burnt its smoke is reported to be a good insecticide. (*See* Timber Trees.)

Bassia longifolia, Roxb. Fl. Ind. ii. 523; Dalz. & Gibs. Bby. Fl. 139. *Ippi, illupi,* also named *mowah.*

This is equally useful as the last, and the flowers and seeds are used for similar purposes: grows at Dhárwár, Malabár, Circars, Mysore and Annamallay. (*See* Timber Trees.)

ASCLEPIADEÆ.

Hoya viridiflora, Dalz. & Gibs. Bby. Fl. 153. *Hirandodi* or *khandodi.*

A twining plant very common in hedges. Leaves used as vegetable.

Leptadenia reticulata. Dalz. & Gibs. Bby. Fl. 152. *Rayadodi, shinguti, dodhi, pala-kuda.*

A shrubby twining shrub with corky bark.

Common, particularly near the sea. The leaves and tender shoots are used as a vegetable in some parts of India at all times; so also the follicles, known as *shinguti* or *dodhi.*

GENTIANEÆ.

Limnanthemum cristatum, Dalz. & Gibs. Bby. Fl. 158.—*Menyanthes cristata*, Roxb. Fl. Ind. i. 459. *Khatara, kumuda.*

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An aquatic plant resembling water lilies, common in the Konkan and in various other parts of India. Flowers white, about one inch in diameter; appear in wet and cold seasons. The stems and fruit are curried, or simply boiled and eaten.

BORAGINEÆ.

Ehretia lœvis, Dalz. & Gibs. Bby. Fl. 170.

The inner bark is mixed with bájri flour and eaten.

CONVOLVULACEÆ.

Rivea hypocrateriformis, Dalz. & Gibs. Bby. Fl. 168. *Phanja.*

Grows in Bombay and the Deccan and other parts of India. Leaves and young shoots used as vegetable.

Ipomœa reniformis, Dalz. & Gibs. Bby. Fl. 164. *Undirkani.*

Common in Bombay and the Deccan. Used as a pot herb.

Ipomœa sepiaria, Dalz. & Gibs. Bby. Fl. 166. *Aumti.*

Common in hedges. Used as above.

SOLANACEÆ.

Solanum nigrum, Linn. Sp. Pl. 266. *Ghati, cammuni, mako.*

A common weed in almost all tropical and temperate parts of the world. Leaves and young shoots used as a pot herb. Ripe fruits eaten as fruit. The herb is cultivated in Mauritius, where it is called *brede.*

Solanum Jacquinii, Dalz. & Gibs. Bby. Fl. 175. *Bhuiringni.*

A diffuse plant, trailing over the ground and armed all over with prickles. Found on waste places. Berry yellow when ripe, size of a plum. Unripe fruits eaten in curries and as a vegetable.

Solanum torvum, Dalz. & Gibs. Bby. Fl. 175.

A shrub 3-4 ft. high with berries the size of an apple. Southern Marátha Country. Used as a vegetable.

ACANTHACEÆ.

Asystacia Gangetica, Thwait. Enum. Pl. Zeyl. p. 235.—*Asystacia Coromandeliana,* Dalz. & Gibs. Bby. Fl. 186.

A small shrub with white or pale-blue flowers. Very common; often cultivated in gardens on account of its beautiful flowers. Eaten as a vegetable.

VERBINACEÆ.

Premna latifolia, Roxb. Fl. Ind. iii. 76; Dalz. & Gibs. Bby. Fl. 200. *Chambari.*

A small shrub with rounded leaves and small greenish flowers. Very common in hedges in the Konkan. The leaves when bruised

have a peculiar and rather unpleasant smell, but these and the tender shoots are boiled with condiments and eaten as vegetable.

Premna serratifolia, Roxb. Fl. Ind. iii. 77. *Bhut-bhiravi,* Bengal.

A native of Bengal. The tender leaves and shoots are cooked and eaten.

LABIATÆ.

Leucas aspera, Dalz. & Gibs. Bby. Fl. 211. *Tumba.*

A small, rough, hispid, herbaceous plant, ½ foot high, growing all along the coast. The leaves and tender shoots are boiled and eaten as vegetable, even in ordinary seasons.

NYCTAGINEÆ.

Boerhaavia diffusa, Dalz. & Gibs. Bby. Fl. 213. *Punarnava.*

A very common weed. The natives use it as *bhaji,* even in ordinary seasons.

Boerhaavia repanda, Dalz. & Gibs. Bby. Fl. 213. *Punarnava.*

Common in the Deccan, Surat and in various parts of this Presidency. Leaves and young shoots are eaten as *shak-bhaji.*

Mirabilis jalapa, Dalz. & Gibs. Bby. Fl. Suppl. 72. *Gul-bhaji, gul-abbass.*

Common in every garden. The flowers have various colours—yellow, white, red and white, red and yellow. It is said that the leaves are used largely as vegetable at Oosson, in the Salem District.

CHENOPODIACEÆ.

Suæda Indica, Dalz. & Gibs. Bby. Fl. 213. Indian salt-wort.

A small erect-growing herb with woody stem. Leaves round, fleshy; grows in salt marshes in the Konkan. The natives eat the leaves as vegetable. Largely resorted to during scarcity.

AMARANTHACEÆ.

Achyranthes aspera, Dalz. & Gibs. Bby. Fl. 218. *Agareh* or *agarah.*

The leaves are used as vegetable, and Dr. Moore says that the natives of Rájputána used to eat the seeds of this plant during the famine which occurred there. Several other species of Amaranth, such as *Ærva lanata, Celosia cristata, Alternanthera sessilis, Amaranthus tristis, A. panniculatus, A. spinosus,* etc., are used as pot herb, and all are wholesome.

EUPHORBIACEÆ.

Euphorbia pilulifera, Euphorbia hirta, Dalz. & Gibs. Bby. Fl. 225.

An annual common weed. Leaves and tender shoots eaten as green.

Acalypha Indica, Dalz. & Gibs. Bby. Fl. 228. *Khokli* (Mar.), *kupi* (Hind.)

A common weed. Leaves used as vegetable.

URTICACEÆ.

Pouzolzia tuberosa, Wight. Icon. Pl. Ind. Or. t. 697.—*Urtica tuberoza,* Roxb. Fl. Ind. iii. 587. *Pilli-dumpa* (Tamul).

It is a small perennial herb, about from 1 to 6 ft. long, growing in good moist soil in Circars and other parts of India. Not described from Bombay. Spindle-shaped, tuberous roots are eaten raw, roasted or boiled.

Ficus Bengalensis, Roxb. Fl. Ind. 539. *Vad* (*wur*).

Ficus glomerata, Roxb. Fl. Ind. 547. *Umbar.*

Ficus religiosa, Roxb. Fl. Ind. 558. *Pimpal.*

Ripe fruits of these and other fig trees are eaten, especially in times of scarcity. The unripe fruit of *F. glomerata* is also eaten in times of scarcity pounded with rice or bájri and made into cake. The tender buds of *F. religiosa* are eaten as vegetable by hill people of Central India during times of scarcity.

SANTALACEÆ.

Santalum album, Roxb. Fl. Ind. i. 449. *Chandan,* sandal-wood tree.

Indigenous in Mysore, Coromandel Coast, Timor and Java. Cultivated in gardens. Naturalized in the Deccan, Gujarát, Central India, Bengal and elsewhere. The seeds eaten during seasons of scarcity.

SCITAMINEÆ.

Musa ornata } **Musa superba** } Dalz. & Gibs. Bby. Fl. 272. *Chavaya, ran-kela.*

These are common at Mátherán, Rám Ghát, Khandála and sides of precipitous crags. The scape and the convolute leaf sheaths which immediately surround it, are cut into pieces, and boiled and made into a dish with spices, or they are dried and pounded into a kind of flour out of which cakes are made. These are resorted to especially in times of scarcity.

AMARYLLIDEÆ.

Crinum Roxburghii, Dalz. & Gibs. Bby. Fl. 275. *Nag-down?*

Bulbous root, radical concave leaves, compressed scape with umbels of 6-16 white flowers.

Common on the banks of the Deccan rivers and throughout India. The bulb is boiled and eaten as *shak-baji.*

Agave Americana, Agave cantula, Dalz. & Gibs. Bby. Fl. Suppl. 93. *Jungly annanas.* Famine Plants

Cultivated in many parts of India. Dr. Cornish in his report on the famine relief measures in North Arcot mentions the use of the flowering stalks of the American aloe as food by the distressed population, and writes as follows:—

"The American aloe is common in waste dry soils, and is used also for fencing. The flowering stalk of the aloe contains a sweet fibrous substance something like the pith of the sago palm, and for miles around Palmanair every flower stalk of the aloe has been cut down for food. The people boil it with tamarind, and it is by no means disagreeable to the taste. The nutritious matter is sugar and starch, but the great bulk of the pith is woody fibre. The interior of the lower part of the leaf stalk of the aloe is used in the same way, and the dried aloe leaf is given to the cattle. The green part of the aloe leaf contains a bitter purgative juice; but when dried in the sun, cattle will eat a little of the lower and thicker end of the leaf. I fear it cannot be a very nourishing diet for them. The prickly pear is fruiting very abundantly this year, and the children especially are eating the fruit to a great extent. The ripe fruit is sweet and juicy, and probably not unwholesome, except where it is used in undue proportion to other kinds of food."

And the "*Englishman*" had some time ago a letter from one of its correspondents containing an extract from a "Report on the Food Products of the North American Indians" in which the following was stated about the American aloe. This plant, called *mescal* by the Americans, "grows upon the most barren mountains, and is taken for food when old enough at any season of the year. It is in its prime, however, when about putting forth its flowering stem. To prepare it for use, the leaves are cut off at the base or crown, leaving a hard, white, bulbous mass, measuring one or two feet in circumference, having a flavour like chestnuts, but somewhat peppery. It cannot be eaten in its fresh state, but must be cooked. For this purpose the Indians dig a hole or pit, ten or twelve feet in diameter and three feet deep, lined with stones, upon which a fire is made, and the stones thoroughly heated. The fire being removed, a layer of damp grass is placed upon the rocks; then the bulbs, which are covered with the tender inside leaves taken from the crowns; a layer of grass is placed over these, and over all a thick coating of earth. After three days the contents of the pit are found to be thoroughly baked and converted into a sweet, juicy article of food; a favourite for use in camp; of a brown colour and resembling pears in taste. It is used as an article of commerce * * * * and is not only pleasant to the taste, but acts as an antiscorbutic * * Cut up into slices it is easily dried, and retains its sweetness for years. * * * * The leaf when washed and dried is employed by the Indians for smoking like tobacco, but being sweet and gummy, it chokes up the pipe. * * * * The crowns are sometimes baked in hot ashes, but are not so good as when baked in the pit. It is a common practice to collect the leaves into suitable bundles and press them flat. They soon dry, and are very sweet, but inferior to the crown. * * The leaf has a dirty black, stringy look, but is the favourite food of the *Apachis* when they are at war or on the hunt * * * A fine *mescal* spirit is prepared from the roasted leaves of *Agave Americana* * * * It is a strong, fiery drink, but not half so injurious as modern whiskey * * * The wasted pulp when cut up, mixed with water, and boiled form a fine syrup, and when dissolved in cold water forms a pleasant drink and an excellent sauce to the usually very dry and insipid articles of Indian food. Although the roasted root is very dark, the distilled

Famine Plants.

spirit is of a clear yellow colour. It cannot be adulterated with water without immediately rendering it ropy and distasteful, the water precipitating some mucilagenous matter or resin contained in it.

LILIACEÆ.

Aloe Indica, Royl. Ill. 390.—*A. perfoliata*, Roxb. Fl. Ind. ii. 167. *Kumar*.

Growing in sandy places in the N.-W. Provinces, and cultivated in gardens of Bombay.

Aloe litoralis, Pharmacop. Ind. 24. *Chota-kunwar, kumar-bij*.

On the sea-coast of the Madras Presidency. The leaf bud or cabbage and tender pith of both these species are much resorted to during famines; but they are unwholesome, and cause dysentery and diarrhœa.

COMMELYNACEÆ.

Commelyna communis, Dalz. & Gibs. Bby. Fl. 555. *Kena*.

An annual with much-branched procumbent stems; deep blue flowers on two peduncles on each circulate spathe. Common in Bombay and throughout the tropics. The rugose seeds contained in oblong capsules were largely consumed in the Sholápur District during the famine.

Cyanotis axillaris, Dalz. & Gibs. Bby. Fl. 256. *Itsaka*.

A creeping annual with 2 or 3 deep blue flowers, nearly sessile within the sheaths, filaments thickened above a dense tuft of hairs, and capsule 3-valved, 3-seeded. Common throughout India, Ceylon and Archipelago. It is stated that the seeds of both these spiderworts were eagerly sought during the famine, and it appears both from experience and from the chemical analysis that they are wholesome and nutritious.

PALMÆ.

Phœnix sylvestris, Dalz. & Gibs. Bby. Fl. 278. *Kajuri*.

Leaf bud or cabbage and ripe yellow fruit are eaten. The tree is common in Gujarát, Konkan, Bengal and Madras, and is highly esteemed on account of its juice, called *toddy*, which is extracted by removing the lower leaves with their sheaths and cutting a notch into the pith of the tree near the top. The juice issuing from this notch is conducted by a small palm-leaf channel into an earthen vessel placed to receive it. *Toddy* is abundantly used by the natives as a cooling beverage, being sweet, and like the water from a tender cocoanut; it is also converted by a process of boiling into sugar, or distilled, after allowing it to be fermented into a kind of inferior spirit called *arak*. The trees begin to yield toddy towards the age of 7—10 years, the trunk being then about 4 feet high, and do so for about twenty-five years. The juice is extracted from November to February, each tree yielding during that period 180 pints on an average. Twelve pints of toddy can be converted into one of jággri, and 4 of this into a pound of sugar, so that each tree produces annually between 7—8 lbs. of sugar, which being inferior in quality to cane sugar, sells usually for three-fourths the price of the latter.

Phœnix farinosa, Roxb. Fl. Ind. iii. 785.

Found in dry sandy places along the coast. Its black ripe fruit eaten.

Borassus flabelliformis, Dalz. & Gibs. Bby. Fl. 279. *Tar, tár-már.*

The juice is named *tarri* and the fruit *tárgolláh*. The fusiform roots of this plant are eaten by very poor people, even in ordinary times.

PANDANACEÆ.

Pandanus odoratissimus, Dalz. & Gibs. Bby. Fl. 279. *Keur.*

Common in the Konkan. The tender floral leaves are eaten raw or cooked with various condiments, and the pulp contained in the lower part of the drupes of the compound fruit is sucked.

AROIDEÆ.

Besides several cultivated species of Arum tribe, numerous wild ones afforded food to thousands of people during the late famine. Almost all the species are acrid and some poisonous, but, as stated above, by being boiled their acrid principle is destroyed or removed. The following are some of those which are supposed to have been resorted to :—

Amorphophalus campanulatus, Dalz. & Gibs. Bby. Fl. 259.

The root tuberous, brown-coloured, of enormous size. Leaves radical, thrice bifid. Spathe large of a dull-red colour. It grows wild on the banks of rivers in the Konkan, and throughout India. It is widely cultivated for the sake of its root, which is said to be a very nutritious food. It is to be remembered that even this cultivated root is acrid.

Arisæma curvatum, Dalz. & Gibs. Bby. Fl. 258. *Sap-kandu* (Khandála name).

Mátherán, Khandála and other Konkan hills.

The tuberous roots of this and allied species of *Arisæma* are used for food in times of scarcity by the Lipchas of Sikkim; they are prepared by burying them in masses in the ground, until acetous fermentation sets in, when they are dug up, washed and cooked. By this means the poisonous properties of the root are in part dispersed, but not altogether, and violent illness often follow a hearty meal of "tong", as this food is called. The nutritious starch, with which these tubers are filled, might be easily separated by grating and washing, and an aliment as good as Portland Island arrow-root (the starch of *Arum maculatum*) be thus procured in quantities.

Typhonium bulbiferum, Dalz. & Gibs. Bby. Fl. 258.

Found in Malabár and Konkan. Both the bulbs and leaves were eaten boiled.

Typhonium divaricatum, Wight. Icon. t. 790.—*Arum divaricatum*, Roxb. Fl. Ind. iii. 503.

Famine Plants.

Common in Bombay, Ceylon, Timor, China, etc.

Theriophonium Dalzelii, Schot. Aroideæ i. 15.

Konkan and Southern Marátha Country and Madras. Leaves and petioles eaten.

Synantherias sylvatica, Schot. Gen. Ar. t. 28.—*Amorphalus sylvaticus*, Dalz. & Gibs. Bby. Fl. 259.

Root, petioles and leaves eaten.

CYPERACEÆ.

Fimbristylis Kysoor, Dalz. & Gibs. Bby. Fl. 288. *Kachera.*

In marshy places in India. The tuber is sold in Bombay and eaten boiled; also in Thána and other places.

During the famine in Behár the root of several other sedges furnished food to numerous people, but these are not identified.

GRAMINEÆ.

Cynodon Dactylon, Dalz. & Gibs. Bby. Fl. 297.

This is a small grass, very common throughout India, known as *Harayali* and *Durva*. Under leaves and culms were eaten during the late famine in Madras.

Eleusine Ægyptiaca, Roxb. Fl. Ind. i. 24.—*Dactyloctenium Ægyptiacum*, Dalz. & Gibs. Bby. Fl. 297. *Mhar-nachani, natchni, nagli, raj.*

Very common in the rains. The rugose seed grains are eaten cooked into porridge.

Panicillaria spicata, Holcus spicatus of Dalz. & Gibs. Bby. Fl. Suppl. 99. *Bájri.*

Cultivated in the Deccan, Gujarát and Khándesh.

Sorghum vulgare, Holcus saccharatus, Dalz. & Gibs. Bby. Fl. Suppl. 99. *Jowári.*

Cultivated in Sholápur, Berár, etc.

Zea Mays, Dalz. & Gibs. Bby. Fl. Suppl. 100. *Butta, mocca.*

Indian corn or maize cultivated both on account of its grain and its leaves, which are a good fodder for cattle.

The cobs of *maize, jowári* and *bájri* are ground and mixed with meal or flour of rice to make bread. They are a little sweet, and at any rate will help to fill the empty stomach.

Triticum Æstivum, Dalz. & Gibs. Bby. Fl. Suppl. *Kapale, gahu* or *gohum*; wheat.

The chaff of this was used in the same way.

Bambusa Arundinacea, Dalz. & Gibs. Bby. Fl. 299. *Varisa* (Sanskrit), *manga, man, bans, tokar.*

This is the tallest bambu, attains 30-50 feet in height and 4-8 in diameter. Culm green, shining, and spinescent. Grows in Poona, Malabár, etc. Famine Plants.

Bambusa vulgaris, Dalz. & Gibs. Bby. Fl. 299. *Kalaka* or *bambu.*

Culm unarmed, 20-50 feet high, green or greenish-yellow. Cultivated in Poona, Sátára and various parts of India.

Dendrocalamus strictus, Brand. For. Fl. 569.—*Bambusa stricta*, Dalz. & Gibs. Bby. Fl. 299. *Bans, bas, bassa, udha.*

Culm armed or unarmed, straight, strong and elastic, with a small cavity or none. Attains 20-40 feet in height. Common throughout India.

Arundinaria Wightiana, Brand. For. Fl. 562.—*Bambusa arundo*, Dalz. & Gibs. Bby. Fl. 299. *Chivari.*

It is a small thorny bambu, 6 to 12 feet high; grows at higher ghâts. Walking-sticks are made of this, and sold at Mahábaleshvar.

The tribe *Bambusaceæ* is represented by several genera, of which the above are found in the Bombay Presidency.

Some of the bambus flower once in about thirty to thirty-two years, and when such an occurrence takes place, the whole tract extending over many miles is in full flower; it sometimes happens, however, that only a few bambus of a cluster flower each year, when the flowering goes on every succeeding year with the other bambus of the cluster. The variety *Arundinaria Wightiana*, however, flowers and dies down annually, when new shoots spring up from the roots and attain their full size in a single season. Both in this variety as in others the flowering is followed by the death of the stems, so that, after seasons of general flowering, a whole district presents for some time the spectacle of a large forest of dried up clumps. The product of the flowering of the bambu is a rice which is consumed by the poorer people in lieu of common rice. A very palatable bread is said to be made of the flower of this rice, although the colour of it is somewhat darker.

In the scarcity of 1812 in Orissa, 1864 in Kánara, and 1866 in Málda this rice formed the principal article of the food of the poor population: hence perhaps the belief entertained by some Government officials that the bambu only flowers in seasons of general scarcity.

From the young and tender bambu shoot, pickle and preserves are made which are considered very palatable by the natives. The sliced shoots are also made into dishes.

Mr. Lethbridge says that all the varieties of bambus are capable of being employed in the manufacture of paper.

FERMENTED DRINKS.

Anamirta cocculus, Dalz. & Gibs. Bby. Fl. 4. *Kakamari.*

The drupes of this twining plant are the *Cocculus Indicus* of commerce. The seeds contained in the drupes are used in Europe to adulterate beer, and in this country to intoxicate and poison fish. It is said that they are also employed in Bombay to increase the intoxicating effects of country spirits sold in retail. As an insecticide they prove very effectual in destroying the pediculi which infest the human body. The drupes are subglobose, or somewhat kidney-shaped, ½ in. diameter, black, wrinkled, enclosing an yellowish, oily, very bitter seed, which contains a crystallisable principle named *picrotoxin*. This is not affected by the re-agents which are usually employed for detecting the bitter poisonous alkaloids. Besides this principle, the seeds contain fat, which amounts to about half their weight, and which is said to be employed for industrial purposes; and *stearic acid,* formerly thought to be *anamirtic* or *stearophanic* acid. *Cocculus Indicus* is exported from Bombay and Madras, and the stock in the dock-warehouses of London on the 1st December, 1872, was 2,010 packages.

Drury says :—"That the seeds are illegally employed in the adulteration of beer by the lower class of brewers in England is an undoubted fact, although the penalties imposed by the Legislature are very severe. It is said that 1 lb. of these berries is equal to a sack of malt in brewing, and it was even recommended by one man, who wrote on the 'Art of Brewing', to add 3 lbs. of seeds to every 10 of malt. A considerable quantity of *Cocculus Indicus* is exported from Malabár and Travancore, and shipped for the London market, where the price varies from 18 to 24 shillings per cwt. The exports from Travancore alone for 1854-55 were upwards of 75 candies. The imports in the English market are about 240 tons annually. In the four years ending 1856, 5,817 cwts. of the seeds were exported from the Madras Presidency, valued at Rs. 7,124, chiefly to Bombay, the United Kingdom and the Persian Gulf."

It is clear that *Cocculus Indicus* has been exported to various ports of Europe from the earliest times. Gerard (Herbal) says it was well known in England (1597) as *Cocculus Indicus,* otherwise *Cocci vel cocculus orientalis*. In 1635 it was subject to an import duty of 2 shillings per pound as *Cocculus Indiæ*. It is said that at the present time it is mostly exported to the Continent of Europe, very little being shipped to England.

Anacardium occidentale, Dalz. & Gibs. Bby. Fl. Suppl. 18. Cashewnut, *kaju.*

A large quantity of spirit is distilled at Goa and on the Malabár Coast. Fermented Drinks.

Acacia leucophlæa, Dalz. & Gibs. Bby. Fl. 86.

A spirit is distilled from the bark mixed with *goor,* and the trees are farmed on account of Government.

A. ferruginea, Bedd. Fl. Sylv. t. 51. *Kaiger, anasandra.*

From this also a spirit is distilled and the trees farmed on account of Government.

Eugenia jambolana, Hook. Fl. Ind. ii. 499.—*Syzijium jambolanum,* Dalz. & Gibs. Bby. Fl. 93. *Jambul.*

It appears that this tree, although very common at Mátherán and Mahábaleshvar, does not bear good large fruit like the ones on the lower ranges. From the large sweet fruits, wine, resembling port in taste and colour, is manufactured at Goa; and spirit is also distilled for local use.

Bassia latifolia, Dalz. & Gibs. Bby. Fl. 139. *Mowah.*

The well-known mowrah spirit is distilled from the flowers of this tree. (*See* Chapter on Timber Trees and Oils.)

Bassia longifolia, also known as *mowah.* The flowers are used for the same purposes.

Ligustrum robustum allied to **L. Neilgherense** of Dalz. & Gibs. Bby. Fl. 159.

In South India the bark of this tree is put into the toddy of *Caryota urens, birly-már,* to accelerate fermentation.

Calatropis gigantea, Dalz. & Gibs. Bby. Fl. 149. *Rui, arkar* or *ak.*

The tribes of the Western Gháts make an intoxicating drink, called *barr,* from the milk sap of the *mudar* or *ak.* The great Akbar was born beneath the ak, and took his name from it according to the local tradition of Umarkot. Barth states that the pagan tribes of Central Africa also prepare from this plant their *giya.* —Birdwood (B. Products).

Cannabis Indica or **Sativa,** Dalz. & Gibs. Bby. Fl. Suppl. 79. *Indian hemp* or *ganja.*

The three principal forms in which Indian hemp is met with in Indian bázárs are, first, *ganja,* the dried flowering twigs and leaves from which the resin has not been removed; second, *churras,* the resinous exudation from the stems, leaves and flowers; and, third, *bang, subji* or *sidhi,* the larger leaves and capsules without the stalks. In addition to these a sweetmeat, called *majum,* is made and sold, composed of bang, butter, sugar, flour and milk. An infusion of ganja or bang is also made, to which pounded *datura* seeds are added with the view of increasing the intoxicating and exhilarating effect. Cases of datura poisoning do occur when datura seeds are mixed in greater proportion than usual.

Fermented Drinks.

Dalz. & Gibs. Bby. Fl. says:—"In Poona a native beer, called *bhoja*, is brewed from jowári grain malted, and the bang is added as a substitute for hops; this is drunk in large quantities, and is said to be a refreshing and innocuous drink."

Caryota urens, Dalz. & Gibs. Bby. Fl. 278. *Már*.

Toddy is made and spirit distilled from the sap of this palm.

Borassus flabelliformis, Dalz. & Gibs. Bby. Fl. 278. *Tár-golláh, tár, már*.

Toddy is made and spirit distilled from the sap of this palm.

Cocos nucifera, Dalz. & Gibs. Bby. Fl. 279. *Már, narel*.

Spirit is distilled from its sap.

Phœnix sylvestris, Dalz. & Gibs. Bby. Fl. 278. *Kajuri*.

Toddy is made from the sap. (*See* Chapter on Fruits and Vegetables and Chapter on Famine Plants.)

Saccharum officinale, Dalz. & Gibs. Bby. Fl. Suppl. 99.

Strong spirit, named *agua ardente*, is distilled at Goa from the juice.

OIL-YIELDING PLANTS.*

BEFORE giving an account of the oil-yielding plants of this district it may be as well to begin by stating that all oils are either *fixed* or *volatile*. Some of the *fixed* oils are called *concrete* oils, *fatty* oils, *butyraceous* oils or *vegetable butters*, from the fact of their being solid at ordinary temperature.

CONCRETE OILS.

GUTTIFERÆ.

Garcinia Indica, D. C. Prod. i. 561, better known as *Garcinia purpurea*, Dalz. & Gibs. Bby. Fl. 31.

The oil is obtained from seeds by boiling them in water, and as the decoction cools, it concretes into a solid cake, which is brittle, of a pale-yellowish colour, bland and mild taste, and preserving its solidity to 98° Far. When melting in the mouth, it leaves on the tongue a sensation of cold similar to that produced by allowing a piece of ice to dissolve upon it. *Kokum* oil, as it is called, is used by the natives in cases of chapped skin, hands, face, etc., and also for adulterating *ghee*. It is an excellent substitute for spermeceti ointment, and is said to be exported to England for admixture with bear's grease in the preparation of pomatums. Experiments conducted by Mr. D'Oliveira Pimentel and various English chemists have shown that this oil can be utilized for candle-making, and the only difficulty in the way of such a use appears to be that the oil cannot be obtained in sufficiently large quantities to serve such a purpose. The seeds yield only 10 per cent of oil.

SAPOTACEÆ.

Bassia latifolia, Dalz. & Gibs. Bby. Fl. 139. *Mohwah* tree.

From the seeds a large quantity of oil is obtained by expression which is used in lamps and for adulterating ghee. It is thick and coarse, and concretes at 95°. It was experimented upon some years ago in England, and found useful in candle-making. A ton of it was reported worth £35, at which figure large quantities could be easily disposed of. (*See* Timber Trees.)

Bassia longifolia, Dalz. & Gibs. Bby. Fl. 139, or *mohe* (Hind.) Also furnishes an oil very like the above, and used for the same purposes. (*See* Timber Trees.)

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* These notes on the oil-yielding plants of the Konkan are culled from an unpublished paper written for another purpose.

Oil-yielding Plants.

MYRISTICEÆ.

Myristica Malabarica, Dalz. & Gibs. Bby. Fl. 4.—*Myristica attenuata,* Dalz. & Gibs. Bby. Fl. 4. *Jungle jaiphal.*

The fruits of these, like the officinal nutmeg, when bruised and subjected to pressure yield oils which are used medicinally.

FIXED OILS.

(Liquid at the ordinary temperature.)

PAPAVERACEÆ.

Argemone Mexicana, Dalz. & Gibs. Bby. Fl. Suppl. 3. Gamboge thistle and *fico del inferno* of Europeans, and *Feringhee datura* or *pilá datura* of the Deccan; *suchianas, brahma dundie.*

A native of South America, naturalized and very common throughout India. It is an annual, from the seeds of which a bland oil may be obtained by expression, which in half-drachm doses is reputed by West Indian practitioners to act as an aperient and at the same time allay by a sedative action the pain in colic. The cake is extremely nutritious to cattle.

CRUCIFERÆ.

Brassica campestris, Napus and **B. juncea** and their varieties, Hook. Fl. Ind. i. 156 and 157. *Sarson, kái, kali, surson, tooria,* rape seed plant.

About 33 per cent. of oil is obtained by expression from the seeds, and is used in India for lamps and dietetical purposes, being seldom exported. A large quantity of the seeds (502,739 cwts. in 1879-80 from Bombay) is, however, being constantly shipped to Europe, etc., where the oil is employed for lubricating machinery. A single locomotive is said to consume 90 to 100 gallons of it annually. Rape seed oil burns considerably longer than olive oil (11 hours of the former to 9 of the latter), and the natives apply it to the body which it is believed to strengthen.

BIXINEÆ.

Hydnocarus Wightiana, Dalz. & Gibs. Bby. Fl. 11. *Kowti oil, kois-tel.*

The seeds yield on being boiled with water an oil which is sometimes used in lamps at Goa, where it is called *koshtel,* and also as an external application in cutaneous affections. The natives consider it to be of use in leprosy and ophthalmia.

GUTTIFERÆ.

Calophyllum inophyllum, Dalz. & Gibs. Bby. Fl. 31. *Andi.*

C. Wightianum, Hook. Fl. Ind. i. 274.—*C. spurium,* Dalz. & Gibs. Bby. Fl. 32. *Cherupinai.* (*See* Timber Trees.)

Mesua ferrea, Dalz. & Gibs. Bby. Fl. 31. *Nág champa* or *thorla champa.* (*See* Timber Trees.)

The seeds of the first-named yield on expression 60 per cent. of an oil used in lamps and for cutaneous affections. The second supplies the oil known under the name of *pootunjee oil*, used also in skin diseases and for lamps. The oil from the seeds of the third is, according to Dr. Æ. Ross, used in Kánara as an embrocation in rheumatism. Oil-yielding Plants.

MALVACEÆ.

Gossypium (several varieties), Dalz. & Gibs. Bby. Fl. 21. Cotton plant, *kapas, rui.*

A very pure oil is obtained on expression from the seeds of the cotton plant which can be recommended for its cheapness, and may, no doubt, be utilized for burning in lamps. Large quantities of this oil are manufactured at Marseilles, where 96 lbs. of Egyptian seed yielded 2 gallons of oil. The cake is valuable as fodder, and large quantities of it are shipped to the English market from China, especially from Shanghai. 53,616 tons were imported into the United Kingdom in 1852. In India the natives believe in the antidotal virtues of cotton-seed oil when used in cases of poisoning from narcotics. Perhaps as a demulcent the oil may be useful. (*See* Fibres.)

Amongst the *Sterculiaceæ* and *Tiliaceæ* there are several plants capable of yielding oils. Very little use is, however, made of them for this purpose.

LINEÆ.

Linum usitatissimum, Dalz. & Gibs. Bby. Fl. Suppl. 16. The well-known common flax plant, called *tisi* or *alsi.*

Linseed yields 22 per cent. of oil, the remaining 78 per cent. of crushed seed or cake being very useful for fattening cattle. Linseed oil burns 11 per cent. longer than olive oil, and is a good drying oil, being, therefore, in request among painters. Indian linseed oil being, however, mixed with mustard oil, is not so much prized as the foreign. This adulteration is inseparable almost from Indian oil, as the flax and mustard are always cultivated side by side in the same field. Linseed is used for a variety of purposes. It is a demulcent useful in diarrhœa, catarrh, dysentery and visceral obstructions (Ainslie). A decoction of the seeds is employed with advantage in the shape of enema in abrasions of the intestines. When mixed with lime water the oil is a favourable application (Carron oil) to burns and scalds. It is one of the chief ingredients in painter's inks and oil varnishes. It may be either expressed cold, or by first heating the seeds to about 200° and then crushing them. The oil obtained by the latter method has a disagreeable smell and brownish colour. Large quantities of flax are annually imported into England from foreign parts. Russia sent in 1872 £ 3,000,000 worth, India £ 1,144,942, Germany £ 144,108. The total quantity imported was 1,514,947 quarters. Bombay exported in 1879-80 539,182 cwts. valued at Rs. 36,10,165.

MELIACEÆ.

Melia azadirachta, Hook. Fl. Ind. i. 544. Better known under its other name *Azadirachta Indica,* Dalz. & Gibs. Bby. Fl. 36. *Nimb.*

Oil-yielding Plants.

From the pericarp of the seed an acrid, bitter oil, called "Margosa oil", is obtained which is considered to be useful in leprosy and is, moreover, anthelmintic and stimulant, being used externally in cases of bad ulcers and as a liniment in headaches and rheumatic affections. The oil may be obtained either by expression or by boiling and is also used for burning and in imparting colour to cotton cloths, as it has itself a deep yellow dye. A large quantity of it is exported annually from Madras to Ceylon. (*See* Timber Trees.)

CELASTRINEÆ.

Celastrus paniculata, Dalz. & Gibs. Bby. Fl. 47. Staff tree, *malkangani, kanguni.*

A tall, scandent, unarmed shrub with small yellow flowers in terminal panicles.

Common on the ghâts and the hilly parts of the Konkan. From the seeds an empyreumatic oil is obtained to which Dr. Herklots gave the name of "Oleum nigrum", and which he employed in the treatment of "beri-beri", in the early stages of which disease it is, no doubt, highly beneficial. It has stimulant properties, and is administered in emulsion in doses of a few drops daily, its introduction into the system being followed in a few hours by free diaphoresis unattended by subsequent exhaustion. The natives call the oil "Kanguni tel".

SAPINDACEÆ.

Sapindus emarginatus, Dalz. & Gibs. Bby. Fl. 35, or *S. trifoliatus,* Hook. Fl. Ind. i. 682. Soapnut tree, *rhita.*

From the seeds an oil is obtained which the natives suppose to possess medicinal virtues, and use externally. The capsule is too well known for its detergent properties producing suds when agitated with water. (*See* Timber Trees.)

ANACARDIACEÆ.

Anacardium occidentale, Dalz. & Gibs. Bby. Fl. Suppl. 18. Cashewnut tree, *kaju.*

Two oils are obtained from this plant: one black and acrid from the pericarp of the nut, which is rubefacient and vesicant, and is used to floors, wooden rafters, etc., to prevent the ravages of the white ant; and the other from the kernel, which is remarkably sweet, edible and wholesome, and might be employed for pharmaceutical purposes. (*See* Timber Trees.)

Semicarpus anacardium, Dalz. & Gibs. Bby. Fl. 52. Marking nut tree, *biba, bilama.*

This plant also yields two oils like the preceding. The oil of the pericarp is used to remove rheumatic pains, aches, and sprains, and is said to be useful in leprosy and scrofula;—that of the kernels is also useful in sprains and rheumatism. Undiluted it is said to act as a blister. (*See* Timber Trees.)

Buchanania latifolia, Dalz. & Gibs. Bby. Fl. 52. *Pyal, chároli.* Oil-yielding Plants.

From the kernels "cheronji oil" is obtained. It has a pale straw colour and is seldom utilized. A black varnish, similar to that of the cashew-nut and other trees of this order, is likewise procured from the pericarp of the nuts of this plant. (*See* Timber-Trees.)

LEGUMINOSÆ.

Arachis hypogœa, Dalz. & Gibs. Bby. Fl. Suppl. 27. *Bhui-mung* or *bhuising.*

An annual, the nuts of which are good for eating and wholesome, and yield 50 per cent. of their weight of an oil considered fit for use for all purposes for which almond and olive oil are employed. This oil does not become easily rancid and has, therefore, been introduced into the Pharmacopœia of India as a basis for ointments. In Calcutta it is used for adulterating gingelly and other oils and for making soaps, but it can be employed for lubricating the most delicate machinery even. French chemists convert it into a very fine imitation of Lucca oil.

Pongamia glabra, Dalz. & Gibs. Bby. Fl. 77. *Karunj.*

From the seeds an abundance of oil is obtained by expression which is used by the poorer classes in lamps, and is also an efficient application in scabies and other cutaneous affections. It is said to have been used with benefit in mange. (*See* Timber Trees.)

Wagatea spicata, Dalz. & Gibs. Bby. Fl. 80. *Wakiry, wagati.*

An annual climber with tapering spikes 1-2 feet long, of scarlet and orange-coloured flowers and legumes constricted between seeds. Common in the Konkan jungles.

An oil used in lamps is procured from the above.

At the exhibition of 1852 in London, oils from the following were shown :—

Abrus precatorius, Dalz. & Gibs. Bby. Fl. 76. *Gunj*, a climbing shrub.

Butea frondosa, Dalz. & Gibs. Bby. Fl. 71. *Palas.* (*See* Timber Trees.)

Cæsalpinea bonducella, Hook. Fl. Ind. ii. 254.—*Guillandina bonducella*, Dalz. & Gibs. Bby. Fl. 79. *Ságargota.* (*See* Timber Trees.)

Pithecolobium dulce, Hook. Fl. Ind. ii. 302.—*Inga dulcis*, Dalz. & Gibs. Bby. Fl. Suppl. 25. *Vilaiti ámli, chinch.* (*See* Timber Trees.)

Trigonella fœnum-grœcum, Dalz. & Gibs. Bby. Fl. Suppl. 21. *Methi.*

Dolichos biflorus, Hook. Fl. Ind. ii. 210.—*D. uniflorus*, Dalz. & Gibs. Bby. Fl. Suppl. 23. *Kulith.*

Dalbergia sisso, Dalz. & Gibs. Bby. Fl. Suppl. 24. *Sissu.* Oil is extracted from the wood.

Oil-yielding Plants.

That from the bonduc or *sagargota* nut seems to be only one used medicinally.

MORINGACEÆ.

Moringa pterygosperma, Dalz. & Gibs. Bby. Fl. 311. Indian horse-radish, *sujna, mungay, segat.*

A well-known tree, the flowers, pods, and leaves of which are eaten by the natives. The root is said to have medicinal properties, and is a valuable rubefacient. The pods contain about 15 seeds, which when deprived of their 3-winged envelope look like pith-balls. These balls contain about 24 per cent. of a clear, colourless, tasteless and scentless oil, called "Ben oil", which might be kept a long time without becoming rancid, and is, therefore, well adapted for the use of the perfumer and watchmaker. (*See* Timber Trees.)

M. aptdera, another species indigenous to Africa, also yield "Ben oil".

COMBRETACEÆ.

Terminalia Bellerica, Dalz. & Gibs. Bby. Fl. 91. The Belleric myrobalan.

Oil obtained from the seeds of this is considered a good application to the hair. (*See* Timber Trees.)

Terminalia catappa, Dalz. & Gibs. Bby. Fl. Suppl. 33. Indian almond tree.

The seeds yield a straw-coloured oil which becomes turbid by keeping. When fresh it has a pleasant taste and is edible. The cake is a good feeding for pigs. From the milk of the young leaves an ointment is prepared useful in scabies, leprosy and other cutaneous affections. The juice of the leaves is said to be useful in headache and colicky pains. (*See* Timber Trees.)

Terminalia chebula, Dalz. & Gibs. Bby. Fl. 91. The chebulic myrobalan.

Dr. Birdwood states that an oil is obtained from this plant, but does not tell us to what purposes it is applied. (*See* Timber Trees.)

CUCURBITACEÆ.

Cucumis sativus. Cucumber, *kakri.*

The seeds yield a sweet edible oil which is seldom extracted.

Cucumis melo. Melon, *tarbuj.*

From the seeds of this a similar oil is obtained.

Cucurbita pepo. White gourd or pumpkin, *kaula.*

The oil from the seeds of this is considered to be anthelmintic by American authors.

COMPOSITÆ.

Carthamus tinctorius, Dalz. & Gibs. Bby. Fl. Suppl. 45. Bastard safflower, *kasumb, kardai.*

Oil-yielding Plants.

This plant is widely cultivated in Europe and Asia from its yielding a dye used for colouring silks. The seeds yield 28 per cent. of a light-yellow oil possessed of drying properties, and useful for culinary purposes and for lamps. This oil is supposed to be the Macassar oil of European perfumers, and although not exported, large quantities of the seed are sent to Liverpool and London.

Guizotia Abyssinica, Cas. in Dicc. Sc. Nat. 59-248.—*G. oleifera,* Dalz. & Gibs. Bly. Fl. 128. *Ramtil, kalátil.*

Extensively cultivated on account of its seeds, which yield 35 per cent. of a sweetish oil, which is very cheap, and resembles gingelly oil. It is used in lamps and for culinary purposes by poor people.

Helianthus annuus, Roxb. Fl. Ind. iii. 443. Sun-flower plant, *brahmoka* (Mar.), *suraj maka.*

Every part of this plant has been applied to some useful purpose. Planted on swampy soils, where it grows without any care, it is a protection against intermittent fevers. The seeds yield 15 per cent. of an oil of superior quality used for edible purposes, for lubricating machinery and for mixing colours which artists employ; the pressed residue or cake forming a good, fattening, wholesome food for cattle. When shelled and ground, in place of being crushed for oil, it produces the finest and most palatable of all flour for the preparation of tea-cakes and other fancy bread, for which purpose it is largely used in Spain; and those who have resided in that country will have observed the peculiarly rich and yellowish tinge upon the best bread supplied to them there, which agreeable peculiarity is derived from the flour used. For this and other purposes it has from time to time been imported in considerable quantities into England. The leaves and stalks are good fodder for cattle and poultry of all kinds, though the stalks when reduced to fibre are much more profitable for the manufacture of paper.

It is said that the sun-flower is extensively cultivated in China, where from the stalk is extracted a fine fibre with which silk is adulterated. Each main head of flowers yields about 800 to 1000 seeds, and the collateral ones 50—60 each.

SAPOTACEÆ.

Bassia latifolia, B. longifolia, Dalz. & Gibs. Bby. Fl. 139. *Mowah.*

A large tree which attains the height of 40—60 ft. From the seeds a greenish-yellow oil is obtained by expression which unscrupulous Banias employ to adulterate ghee (clarified butter) with in some parts of India. The seed-cake is stated to be useful for poisoning fish, and its smoke to act as an insecticide, and to kill smaller animals like rats, etc. (*See* Timber Trees.)

PEDALINEÆ.

Sesamum Indicum, Dalz. & Gibs. Bby. Fl. 161. Gingelly oil plant, *til, krisha-til, barik-til.*

Oil-yielding Plants.

Extensively cultivated every where on account of its seeds, which yield 45 to 50 per cent. of oil. This oil, which was used in Europe in the days of Pliny instead of olive oil, has a light-yellow colour, a mild agreeable taste, scarcely any smell, and is used in lamps and cookery. It keeps for years without becoming rancid, and in Japan it substitutes butter in frying fish and other purposes. The cake, left after the expression of the oil, is very good fodder for fattening cattle. The seeds are abundantly used in native confectionery mixed with sugar or jaggri; or, roasted and ground into meal, are eaten. Large quantities of it are annually exported to Europe. The exports from Bombay in 1879-80 amounted to 511,368 cwts. valued at Rs. 40,63,241.

Gingelly seeds of commerce are of two kinds, one white and the other black, the white variety being the rarer of the two. The black seed or *kalá-til* must be carefully distinguished from that of *Guizotia Abyssynica*, which also bears the same vernacular name.

The following mode of extraction of the oil is given in the Jury Reports of the Madras Exhibition:—"The method sometimes adopted is that of throwing the fresh seeds, without any cleansing process, into the common mill, and expressing in the usual way. The oil thus becomes mixed with a large proportion of the colouring matter of the epidermis of the seed, and is neither so pleasant to the eye nor so agreeable to the taste as that obtained by first repeatedly washing the seeds in cold water, or by boiling them for a short time, until the whole of the reddish-brown colouring matter is removed, and the seeds have become perfectly white."

The black seeds yield the largest percentage of oil. The oil from both kinds of seeds sells at the same price, the average being from 3 to 4 rupees per maund of 25 lbs.

EUPHORBIACEÆ.

Aleurites Molluccana; Bedd. Fl. Sylv. t. 276.—*A. triloba*, Dalz. & Gibs. Bby. Fl. Suppl. 76. *Akhrut*, Indian or Belgaum walnut.

The nut is palatable, and 31½ pounds of it yield, with very little labour, 10 gallons of a clear oil considered a good substitute for rape seed oil, and fit for employment in the manufacture of candles. (*See* Timber Trees.)

Ricinus communis, Dalz. & Gibs. Bby. Fl. Suppl. 78. Castor-oil plant, *erundie* (Dec.)

There are two species, the large and small seeded. The former yields a heavy, disagreeable, dark-coloured, gross oil which is only fit for burning. The medicinal oil is extracted from the smaller seeds, either with or without the aid of heat, the last being more esteemed as it is paler and cleaner. For domestic use the oil may be obtained by taking, say, 5 sers of the small castor-oil seed, soaking them in cold water for one night, next morning straining off the water, and putting the seeds in fresh water and boiling them for about two hours, then again straining the water off. The seeds must now be dried for three days in the sun, bruised in a mortar

Oil-yielding Plants.

and set to boil with the addition of ten measures of water, the whole being constantly stirred till all the oil comes up to the top; it may now be strained off, and on cooling is fit for use. Castor-oil is not only purgative, but is also used by the Hindus as an external application in skin-diseases. Large quantities of the oil and seed are exported to Europe. In 1872-73 Bombay sent to Genoa 1350 cwts. seeds and 2452 gallons of oil.

Jatropha curcas, Dalz. & Gibs. Bby. Fl. Suppl. 77. Physic nut, *Arabi* or *Mooglai erundie, Japal erundi.*

A hedge plant well known to school-boys on account of its juice, which seems to contain caoutchouc, and which is easily blown into bubbles. The seeds yield on expression 30 per cent. of a colourless or pale-yellow oil, which has purgative properties. 12 to 15 drops of this oil are said to be equal in action to an ounce of castor-oil, but the effect is uncertain. The seeds act as an acro-narcotic poison. The diluted oil forms a useful embrocation in chronic rheumatism. It has received the name of seed oil, and has within the last few years been brought to notice as a substitute for olive oil in dressing woollen cloths. It is a good drying oil, and the Chinese employ it in conjunction with oxide of iron in the preparation of a varnish.

PALMÆ.

Cocos nucifera, Dalz. & Gibs. Bby. Fl. 279. Cocoanut tree, *naril.*

Every body is acquainted with the manifold useful purposes for which this palm is applied. An old writer said that this tree was alone sufficient to build, rig, and freight a ship with bread, wine water, oil, vinegar, sugar and other commodities. The leaves are used for thatching roofs; the thick stem makes picture frames and other articles of furniture; the shell of the nut is made into curiosities. The husk boiled in water is used in fevers; that of the green nut is an anthelmintic. The cabbage or terminal bud makes a fine pickle. The spathes yield toddy used for conversion into *juggri*, vinegar, or *arrack* spirit. The fibres of the husk constitute the coir of commerce. The kernel yields oil, which, besides being used in lamps and cookery, is exported in enormous quantities for employment in soap and candle manufacture. It is also sometimes prescribed medicinally in cases where cod-liver-oil is indicated. Some idea of the enormous quantity of cocoanut oil exported from India may be formed from the fact that from Travancore alone about 1063 candies of oil, besides 20,000 candies copra and above 5 million nuts are shipped annually to various ports. To obtain the oil the kernel is divided into pieces and placed on a shelf with a charcoal fire underneath to dry them. After two or three days they are placed on mats and kept in the sun to dry; when they are fit for the press. A hundred nuts yield in this manner about 2½ gallons of oil; but, since the introduction of steam presses, the yield has considerably increased. The cake is capital food for animals, and is said to be also a very superior kind of manure.

Oil-yielding Plants.

VOLATILE OILS.

ANONACEÆ.

Uvaria narum, Dalz. & Gibs. Bby. Fl. 3.

A climbing shrub, which is a native of the Konkan, Mátherán and Travancore, and bears flowers, at first brownish-green, but which subsequently become reddish. The anthers are yellow, and an unctuous secretion exudes from them. From the roots a sweet-scented medicinal oil is extracted on the Malabár Coast.

RUTACEÆ.

This order, of which the orange is a well-known product, furnishes oils of considerable value. The various species of the genus *Citrus* were originally of Asiatic origin, but are now extensively cultivated throughout temperate Europe also. Oils are procured from the rind, leaves and flowers, principally in Italy and France. The industry is, however, one that can hardly be expected to flourish in India, where the sale of the fruit, which is produced in comparatively small quantity, will be found to be more profitable than its use for the extraction of oil. Small quantities of oil are, however, obtained from the following:—

Murraya Koenigii, Hook. Fl. Ind. i. 503.—*Bergera Koenigii*, Dalz. & Gibs. Bby. Fl. 29. *Khari nimb* (Mar.)

An oil extracted from this is used medicinally.

Zanthoxyllum Rhetsa, Dalz. & Gibs. Bby. Fl. 45. *Cherphal tephli* (Goa.)

The seeds yield an oil which is highly aromatic, and is possessed of medicinal virtues. Being very expensive it is seldom extracted. It may, however, be sometimes met with at Goa.

Atalantia monophylla, Dalz. & Gibs. Bby. 28. *Makur-limboo, makri.*

A medicinal oil esteemed by the natives is obtained from this plant.

Ægle marmelos, Dalz. & Gibs. Bby. Fl. 31. *Bela* (Mar.)

From the flowers a scented water is distilled in Southern India.

ROSACEÆ.

Rosa, Dalz. & Gibs. Bby. Fl. Suppl. 31. *Guláb* (Mar.)

The several varieties of the rose all yield, or are capable of yielding, rose water and *attar* or otto. In Ghazipore the distillation of rose water is an industry that engages a large portion of the population—men, women and children, the value of the roses grown in that district amounting to about 15,000 to 20,000

Rs., and the profit made by their distillation to Rs. 40,000. A thousand roses yield 1½ ser of rose water, but it is estimated that a tola of the attar requires one lac of flowers. This attar, which is pure (that sold in the bázár is always adulterated with sandal-wood or geranium oil or roosa-oil) is sold at 50 to 60 Rs. per tola, and is not exported, being barely sufficient to meet the demands of native princes and magnates. It congeals at 20° C. The method of obtaining the oil and water employed at Ghazipore is of the most primitive kind and involves much wastage. An account of it may be found in Dr. W. W. Hunter's Statistics of Bengal. Improved methods would, no doubt, increase both the yield as well as the profits. The natives consume large quantities of rose water on occasions of marriage festivals, and use it also in their sweetmeats.

UMBELLIFERÆ.

Carum copticum, Hook. Fl. Ind. ii. 682.—*Ptychotis ajowan*, Dalz. & Gibs. Bby. Fl. Suppl. 41. The *ajowan*, *owa*, or *oomum* plant, Bishop's weed.

An annual cultivated all over India the seeds of which yield a volatile oil, colourless at first, but which soon acquires a yellow tinge. It has the odour of the fruit, and an acrid burning taste, and is used as a stimulant, carminative and antispasmodic.

Ptychotis montana, a common plant in the hills of the Konkan.

The seeds yield oil, which is used in rheumatism.

SAPOTACEÆ.

Mimusops elengi, Dalz. & Gibs. Bby. Fl. 140. *Wowli* (Mar.), *bacul mulsari* (Hind.)

A tree common to the whole of India, the flowers of which contain a volatile oil from which a sweet-scented water is distilled. The seed also contains oil. (*See* Timber Trees.)

OLEACEÆ.

This order supplies us with some of the most sweet-scented of our garden plants, such as—

Jasminum sambac, Dalz. & Gibs. Bby. Fl. 137. *Mogra.*

Jasminum latifolium, Dalz. & Gibs. Bby. Fl. 138. *Kussar.*

Nyctanthes arbortristis, Dalz. & Gibs. Bby. Fl. Suppl. 51. *Parijátuhk.*

And several other jasmines from all of which we may distil the volatile oils, or, if they are fugaceous, employ them for scenting some of the fixed oils. (*See* Timber Trees.)

Olea fragrans, Dalz. & Gibs. Bby. Fl. Suppl. 50.

Introduced from China, and used for perfuming teas.

Oil-yielding Plants.

LABIATÆ.

In this order, instead of the English thyme, lavender, rosemary, mint, &c., we have—

Ocimum sanctum, Dalz. & Gibs. Bby. Fl. 204. The sacred *tulsi* (Mar.) used in Hindu worship.

Ocimum basilicum, Dalz. & Gibs. Bby. Fl. 203. Sweet basil, *firanjmushk* (Pers.) which possesses a fragrant camphoraceous taste, and is used for its supposed stimulant, diaphoretic and expectorant virtues.

Ocimum pilosum. *Tukhm-i-rahan* (Mar.)

Used as a demulcent in catarrh and for the relief of after-labour pains.

Ocimum gratissimum, Dalz. & Gibs. Bby. Fl. 203. *Tulsi-bija, tulsi bij.*

Considered to be useful in the aphthæ of children.

Micromeria Malcolmiana, Dalz. & Gibs. Bby. Fl. 209. Possessed of all the aromatic and carminative properties of peppermint.

Anisomeles Malabarica, Dalz. & Gibs. Bby. Fl. 210, or *Gul-i-gaozaban,* than which few plants are more appreciated by the natives; an infusion of the bitter aromatic leaves being useful as a stomachic, and the oil distilled from them being considered an effective application in rheumatism.

Pogostemon patchouli, Dalz. & Gibs. Bby. Fl. Suppl. 66. *Patcha* (Mar.), the tops of which were at one time used for scenting Cashmere shawls exported to Europe, and are now left in our cupboards for the like purpose.

Lavandula Burmanni, Dalz. & Gibs. Bby. 207. *Gorea* (Mar.)

Very common in Poona and the Deccan. And many other highly aromatic plants common in India might be utilized in substitution for oils received from Europe.

LAURACEÆ.

Cinnamomum Zeylanicum, D. C. Prod. xv. 1-13. *Dara chini* (Mar.)

The bark is met with in the bázár in closely rolled quills of a light-yellowish brown colour and fragrant smell. This smell is due to the presence of a volatile oil possessed of aromatic, carminative and stimulant properties which is much used in medicine. A drop or two introduced into a carious tooth is found useful in relieving toothache. (*See* Timber Trees.)

SANTALACEÆ.

Santalum album, Dalz. & Gibs. Bby. Fl. 224. White sandal-wood or *sáfed chandan.*

Oil-yielding Plants.

This tree is well known for its fragrant wood, the distillation of which yields 3 per cent. of a fragrant oil which is a perfect substitute for copaiba. The part of the wood nearest the root yields the best oil. The wood rubbed in water is used as an application to erysipelatous inflammations and cutaneous affections, and allays the itching (*See* Timber Trees.)

PANDANACEÆ.

Pandanus odoratissimus, Dalz. & Gibs. Bby. Fl. 279. The screw pine, *keura* (Mar.)

A well-known bushy shrub with long imbricated leaves, the margins of which are armed with fine sharp spines. The sexes on separate bushes. Fruit like a pine apple. The bracts are very fragrant, and an oil, called *keura oil,* is distilled from them. The perfume is chiefly extracted from the male flower bracts. The oil impregnated with the odour of the flower bracts, and the water distilled from them called *keura-arak,* are esteemed stimulant and antispasmodic, and employed in headache and rheumatism. A medicinal oil is also prepared from the roots.

GRAMINEÆ.

The scented grasses are grown and cultivated throughout the Presidency. The following are frequently met with :—

Andropogon nardoides, Dalz. & Gibs Bby. Fl. 302; Linn.

The grass which yields the oil of *citronelle,* and is cultivated in Ceylon, where it reaches the height of 6 to 7 ft. This oil has a light-greenish colour, and is exported to Europe. It is used in medicine for the same purposes as the lemon grass or verbena grass oil.

Andropogon Schœnanthus, Dalz. & Gibs. Bby. Fl. Suppl. 99; Linn : which yields oil known as lemon oil.

This oil is used in Turkey for adulterating otto of roses. Before being mixed with the attar it is shaken with water acidulated with lemon juice, and then exposed to the sun and air. This process gives to the oil a pale straw colour and deprives it of its penetrating after smell. A large quantity of grass oil added to the attar prevents the congelation of the latter.

Andropogon Iwarancusa, Roxb; Dalz. & Gibs. Bby. Fl. 301. It is found at Ahmedabad and Karáchi. It yields an oil named *cusha* oil.

The oil-yielding grasses of India require careful examination. It appears to me that *Andropogon Martini* of Roxburg and *A. nardoides,* found in Khándesh and parts of the Deccan, are varieties of *Andropogon Iwarancusa.*

Andropogon muricatus, Dalz. & Gibs. Bby. Fl. 302. *Khus-khus* (Mar.)

This grass is well known from its fragrant root used for making tatties. No oil, however, appears to be extracted from it.

FIBROUS PLANTS.*

The Bombay Presidency produces a large number of plants that yield fibre for conversion into strings and ropes, or suitable for paper manufacture.

ANONACEÆ

Unona pannosa, Bedd For. Sylv An. Gen. ix

The inner bark gives strong fibre adapted for cordage and paper-making.

BIXINEÆ.

Bixa orellana, Dalz. & Gibs. Bby Fl. Suppl 5. *Kesri, shendri, arnotto.*

From the bark of this plant cordage is made in the West Indies This is a tall shrub or small tree with cordate leaves on long petioles, flowers in terminal panicles, pale, purple, or white; capsules prickly. The red pulp which covers the seed is called *arnotto* and is used for colouring cheese.

MALVACEÆ

This order contains numerous plants, the inner bark of which yields fibre.

Thespesia populnea, Dalz. & Gibs. Bby. Fl. 18. *Bendi.*

The bark yields coarse fibres adapted for paper.

Hibiscus cannabinus, Dalz. & Gibs Bby. Fl. 20. *Ambari.*

It is cultivated for its capsule, which is used as a vegetable. An annual or perennial, stem glabrous, prickly, leaves lower cordate, upper deeply palmately five-partite, segments narrow, lanceolate, acuminate, serrate, petiole prickly. Stipules pointed. Flowers axillary, yellowish, with a crimson centre, sepals bristly.

The fibres of this plant—which are prepared by steeping the stems in water, are hard, and more remarkable for strength than for fineness—might be considerably improved by care. A line made of them, 4 ft. long, sustained, when dry, a weight of 115 lbs., in the wet state its tenacity was greatly increased, and it bore a strain of 133 lbs. Is only adapted as a mixture for the commoner description of paper.

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* These notes are a summary of an unpublished paper written for another purpose.

Fibrous Plants

Hibiscus mutabilis, Dalz. & Gibs. Bby. Fl. 1. The changeable rose, or "*amor inconstante*" (inconstant love) of the Portuguese.

A tall shrub common in gardens.

Hibiscus (Abelmoschus) esculentus, Dalz. & Gibs. Bby. Fl. Suppl. 7. *Bhendy.*

A much cultivated esculent. A line made from the fibres of this sustained, when dry, a weight of 79 lbs., and when wet of 95 lbs. This fibre is rougher than that of *H. cannabinus*, and therefore, adapted for conversion into paper.

Hibiscus tiliaceus, Roxb. Fl. Ind. iii. 192.—*Paritium tiliaceum*, Dalz. & Gibs. Bby. Fl. 17.

A tree met with in Bombay wild and in gardens, of the inner bark of which in Otaheite, matting, lines for fishing and ropes are made, and which in the West Indies is sucked in times of famine.

Hibiscus furcatus, Dalz. & Gibs. Bby. Fl. 19.

A prickly plant the bark of which is also full of strong white fibres possessed of considerable tenacity. A dry line made from them broke at 89 lbs. and a wet one at 92 lbs.

Hibiscus Surratensis, Dalz. & Gibs. Bby. Fl. 20. *Rhan bhendy*, the bark of which also yields strong fibre.

Hibiscus sabdariffa, Dalz. & Gibs. Bby. Fl. Suppl. 7. *Roselle* plant.

From the bark of this, when the stem is cut while the plant is in flower, a fine and silky fibre may be obtained. Of the calyces and capsules freed from the seed jellies and tarts are made.

Another Malvaceous plant, which has of late attracted much attention is—

Malachra capitata or rotundifolia, Dalz. & Gibs. Bby. Fl. Suppl. 9.

An annual or perennial, prickly. Leaves orbicular, and rather angled 5-6 in. broad. Stipules narrow. Flowers small, yellow, in axillary or terminal heads. Fruits nearly globose, depressed.

This plant is said to have been introduced into India from Brazil; it now grows and thrives everywhere, attaining in good situations the height of 4-9 ft. The fibre has a silvery appearance with a peculiar lustre, and is almost as soft as silk. In passing the fibre through the machinery damped with oil and water, as is commonly done with Konkan jute, yarn was produced strong enough and nearly equal to that made from the second quality of Bengal jute. If the plant is carefully grown and well looked after, the fibre would, no doubt, rank fully equal to Bengal and Bombay *jute*. Owing to the high prices ruling for *jute* in Bengal and elsewhere the new fibre, if carefully prepared, would command a ready sale at Rs. 3-12-0 to Rs. 4 per Indian maund. But it is not so valuable for spinning as *jute*, being harsh, and lacking the forked ends of the latter.

Fibrous Plants.

Abutilon Indicum, Dalz. & Gibs. Bby. Fl. 18.

Belonging to the same family, also yields good fibre. It is a tall herbaceous plant, 3-5 ft. high, known at Goa, Málva and Bengal as *petari* (a name given also to an euphorbaceous plant, *Trewia nudiflora*) and in Bombay as *mudmi* and sometimes as *kangai* (comb) Other species of this genus also furnish good fibre.

Urena lobata and **Urena sinuata**, Dalz. & Gibs. Bby. Fl. 18.

The latter known at Málvan and Goa as *tupkoty*, both supplying a material fit for conversion into cordage and paper.

Sida carpinifolia, D. C. Prod. i. 460.—*Sida acuta*, Dalz. & Gibs. Bby Fl 17.

Pat, called *chá* (tea plant) at Goa, and the several species of this genus all of which abound in very tough and strong fibres, which are easily made into ropes, and are also fit for the manufacture of paper.

Then again we have the cotton plant Although merchants deal in a large number of cottons, there are, as a matter of fact, only four species of the genus *Gossypium*, with their varieties, which are recognized by botanists, *viz* —

Gossypium Stocksii Hook. Fl. Ind *i*. 349

Found wild in Sind.

Gossypium herbaceum, Dalz & Gibs Bby Fl Suppl. 8.

Cultivated all over India, and having four varieties—

G. obtusifolium, Roxb. Fl. Ind. iii. 183.

G hirsutum, Roxb Fl. Ind. iii 185.

G. religiosum, Dalz & Gibs. Bby Fl. Suppl. 8.

G. vitifolium, Roxb Fl Ind. iii. 186.

Gossypium arboreum

Found in the plains of India and in gardens, not generally cultivated

Gossypium Barbadense, Roxb. Fl. Ind iii. 187

It is cultivated, and yields the several American varieties Of this form we have the variety—

G. acuminatum, Dalz & Gibs Bby Fl. Suppl 8

It is usually larger in foliage than the other varieties and species. The natives call the cotton plant *kappas* or *kapus*

The white hairs obtained from the capsules are known all the world over from the many domestic and manufacturing uses to which they are applied. The sacred thread of the Bráhmans must, according to the institutes of Manu, be made of cotton only, and Zoroaster enjoined on his followers the use of the cotton *sadra*, and on the priesthood the white cotton turban as symbolic of their holy calling and of the pure lives they were expected to lead. Besides the hairs obtained from the capsules of the cotton plant, fibres may also be extracted from the bark of the stem, which are fit for conversion into cordage and paper.

Kydia calicyna, Dalz. & Gibs. Bby. Fl. 24. *Warung.* Also yields excellent fibre. Fibrous Plants

Adansonia digitata, Dalz. & Gibs. Bby. Fl. Suppl. 9. *Gorik-chinch, gorak-ambla, baobab.*

Contains fibres fit for cordage and for the manufacture of paper.

Eriodendron anfractuosum, Dalz. & Gibs. Bby. Fl. 22.

Yields an excellent, clean, white fibre adapted for rope and paper-making.

STERCULIACEÆ.

In this order, which is allied to the *Malvaceæ*, we find the following fibre-yielding plants :—

Sterculia guttata, Dalz. & Gibs. Bby. Fl. 23.

A large tree common along the ghâts, yielding seeds the size of a chestnut which are roasted and eaten by the natives.

The tree is known to them by the name of *kukar* or *goldar*. Cloth is manufactured from the bark of this tree at Malabár in the following manner :—The tree is felled, its branches lopped, the trunk cut into pieces, 6 ft. long, a perpendicular incision is made in each, the bark opened, taken off entire, chopped, washed, and dried in the sun. In this state it is used for clothing. The tree is not cut for this purpose till the tenth year. The fibres are well adapted for cordage and for coarse paper.

Sterculia colorata, Dalz. & Gibs. Bby. Fl. 23. *Khowsey* or *bheckhol.*

A large tree, found in the jungle tracts of the Konkan, which also yields fibre.

Sterculia villosa, Dalz. & Gibs. Bby. Fl. 22. *Gul-kandar.*

A large tree growing in the Konkan, Vengúrla and Kánara, from the bark of which ropes and bags are made in Goa and Kánara.

Sterculia urens, Dalz. & Gibs. Bby. Fl. 23. *Kavali* or *kandul.*

Also a large tree furnishing fibres as good as those of the preceding, and a gum resembling and used as a substitute for tragacanth.

Sterculia fœtida, Dalz. & Gibs. Bby. Fl. Suppl. 10. *Jungly badam, poon* or mast-tree, *deodar* of the natives of Bombay.

A tall straight tree, the trunk of which is used by the natives for masts.

Helicteres isora, Dalz. & Gibs. Bby. Fl. 22. *Muradsing, kwaan, kiwani, dhamni,* or screw-tree.

A tall shrub or small tree. Flowers bright red and showy, appear in the rains, carpels five, screw-like, twisted together. The fibres are used in the manufacture of ropes ; they are very coarse.

Guazuma tomentosa, Dalz. & Gibs. Bby. Fl. Suppl. 11.

The *bastard cedar* of American origin and common in Bombay. The inner bark yields good strong fibre.

Fibrous Plants.

TILIACEÆ.

In this order, which is also allied to the two preceding, several fibre-yielding plants are to be met with.

Grewia tiliæfolia, Dalz. & Gibs. Bby. Fl. 26. *Daman.*

Grewia microcos, Dalz. & Gibs. Bby. Fl. 26. *Shiral, ansale.*

It bears fruit of a blackish purple colour, eaten by the natives.

Grewia Asiatica, Dalz. & Gibs. Bby. Fl. 26.

Cultivated on account of its gratefully acid fruit called *phalsi.*

Grewia polygama, Dalz. & Gibs. Bby. Fl. 26. *Gowli* or *gœwali.*

Common in Sálsette and the gháts. The other species of *Grewia* also yield good fibres.

Triumpheta angulata, Dalz. & Gibs. Bby. Fl. 25.

T. rotundifolia, Dalz. & Gibs. Bby. Fl. 25. Called at Málvan and Goa *tupcoty.*

It might be utilized for the same purposes as *Grewia oppositifolia*, of the inner bark of which the Himalayan natives make ropes and coarse cloth.

But the most important plant belonging to this order is

Corchorus capsularis, Dalz. & Gibs. Bby. Fl. 25. The *jute* plant.

An annual. Leaves oblong, acuminate, coarsely toothed, base generally prolonged into tail-like appendages. Flowers small, yellow. Capsule truncate, wrinkled, muricated, 5-celled. Seeds few in each cell.

Common throughout India. Jute is an article that has begun to figure in commerce only during the last quarter of a century. About that time barely 5000 tons of it were imported annually into England; forty years ago the imports were nil. At present England imports, on an average, 300,000 tons of the fibre annually, and all this enormous quantity and more is produced in India, whence it is also sent to other parts of Europe and America. The fibres of *C. capsularis* are remarkable for their strength: a line 4 ft. long made from them sustained, when dry, a weight of 143 lbs., and when wet of 146 lbs. Similar to it is

Corchorus olitorius, Dalz. & Gibs. Bby. Fl. 25.

An annual. Leaves ovate, acuminate, 3-5 nerved, serrated, the two lower serratures prolonged into long sharp points. Flowers yellow, peduncles 1-3-flowered. Capsules nearly cylindrical, elongated, 10-ribbed, 10 to 12 times longer than broad, with sometimes 5 terminal points.

Commonly cultivated as a pot herb, and for its fibres; also called jute. These filaments are, however, not so thin as those of the foregoing, nor so strong. A dry line made from them sustained only 113 lbs., and a wet one 125 lbs. The natives are said to use the leaves and tender shoots of this plant for making salad.

LINEÆ

Fibrous

In this order we have the following very common and extensively cultivated plant:—

Linum usitatissimum, Dalz. & Gibs. Bby. Fl Suppl. 16 *Alsi*, the common flax plant.

An annual. Stem 2-4 ft. high, erect, branched above, simple below. Leaves narrow, lanceolate. Flowers blue-coloured, 1-in diam Capsule 5-celled.

The plant yields excellent filaments, but unfortunately they are utilized in few places for commercial purposes, in this country the cultivation being carried on more with a view to producing a large crop of the seed from which linseed oil is obtained, than for the fibre

RHAMNACEÆ.

Represented by only one small shrub,

Ventilago Madraspatana, Dalz. & Gibs Bby. Fl. 48 *Lalandí kanvail.*

From the bark of this cordage is made Rumphius says that the Amboyna fishermen use the flexile stems of it instead of ropes

LEGUMINOSÆ.

This order is represented by a few fibro-yielding plants, although it supplies us with a large quantity of beans, grains, medicines, dyes and timbers. The plant best known is

Crotolaria juncea, Dalz. & Gibs. Bby. Fl 51. The hemp; *sunn* or *tag* as it is called by the natives.

Annual, stem erect, 4-8 ft. high, slightly striated, and more or less clothed with shining silky pubescence Stipule and bracts setaceous. Leaves scattered, narrow, lanceolate, obtuse, mucronate, 2-6 in. long by ½ in. broad. Racemes terminal Flowers papilionaceous, large, of a beautiful bright-yellow colour, calyx densely covered with rusty tomentum. Pod club-shaped, 2 in. long, broader upwards, twice the length of the calyx, downy Seeds numerous, kidney-shaped.

It is hardly necessary here to enter into a description of the various methods of extracting the *sunn* fibre, or of the several purposes for which it is employed The usual method is by steeping the stems in running or stagnant water for a few days It may be stated here that the great Hindu lawgiver Manu enjoined on the Kshatrias the use of the sacred thread made of the *sunn* fibre *C Burhia* and several other *Crotolarias*, of which there is a goodly number, all yield more or less good fibre which is extensively used for cordage and gunnies The refuse could be employed (as well as the fibre itself) for paper-making In fact, old gunnies are often used here and also exported for this purpose.

Butea frondoza, Dalz. & Gibs. Bby. Fl. 71. *Pallas.*

The bark of the roots of which yields a fibre used for caulking boats on the Ganges and other rivers; also for slow matches and cordage.

Fibrous Plants.

Bauhinia racemosa, Dalz. & Gibs. Bby. Fl. 82. *Apta* tree, the fibres of which make strong and durable ropes, and the bark slow matches for matchlock men.

Bauhinia Vahlii, Dalz. & Gibs. Bby. Fl. 83. *Chambuli.*

Common at Khandâla, Thal and other ghâts. Is an immense stout climber, from the bark of which ropes are prepared by boiling and then beating it. This fibre is suited only for the coarser kind of paper. The seeds are eaten raw, and the leaves are employed for thatching houses.

Acacia leucophlea, Dalz. & Gibs. Bby. Fl. 86. *Hiwar.*

Is said to yield a strong and tough fibre used for fishing nets and cordage.

MYRTACEÆ.

Is represented by a single plant.

Careya arborea, Dalz. & Gibs. Bby. Fl. 95. *Kumba* or *kumbia.*

It supplies coarse strong cordage, and a stuff suitable for brown paper of good quality.

ASCLEPIDEÆ.

In this order we meet with

Calotropis gigantea, Dalz. & Gibs. Bby. Fl. 159. *Rui* or *rowee, arka* or *akari.*

A tall shrub covered with soft white tomentum. Leaves 4-8 in. long, oblong, ovate or obovate, downy, short-acuminate, nearly sessile, with a cordate, often amplexicaul base. Flowers large, purplish, lilac, or white, inodorous, with a grey down outside. Corolla, lobes spreading or reflexed. Follicles ovoid, ventricose, green.

Common in the Konkan. From incisions in the bark an article which, when duly prepared, answers all the tests and has many of the properties of gutta-percha, can be produced.

The stems, when cut and dried, yield a lustrous, silk-like fibre, equal in many respects to flax, and superior in strength to hemp. To obtain it the method followed in some places is: the largest branches are cut during the flowering season in October-November, and allowed to dry for three days. They are then beaten, and the fibre is picked off the inside of the bark, the workmen biting through it about the centre of the whole length, holding the tissue of the fibre in one hand, and separating the bark with the other. The fibre is also obtained by steeping the stems in water, but this process injures the filaments. Ropes and fishing lines are made from the fibre, and hill-men make their bow-strings from it, as it lasts well (about five years) through all sorts of weather. In former times a cloth for the use of princes was manufactured from it.

The follicle on bursting yields a smooth, glossy, yellowish-white product much resembling *silk floss.* This floss or cotton is utilized for spinning and weaving, but being difficult to spin on account of its glossy nature and short fibre, it is usually mixed with cotton in various proportions. It seems also capable of being blended with silk or wool to produce a brilliant, yet cheap, article of wear. It is also employed for stuffing pillows and quilts, and if collected free from dirt it only requires the ordinary bow to make it fit for use.

For paper manufacture this cotton has the great advantage that it can very easily be had clean, and requires no elaborate preparation beyond maceration in water, pulping, and but little washing to convert it into paper stuff. Some very fair paper was prepared in this manner in the Gujarát Jail. The fibres of the stem are also well suited for making a first-class paper, being long, flexible, and very strong; in fact, in Bellåry and Furruckabad paper has been manufactured from it. Fibrous Plants.

The leaves and stalks serve for reclaiming *reh* (covered with saline efflorescence) lands. These leaves are strewn about the ground and covered with earth, and then crushed by being stamped upon. Water is then let on the land enough to flood it. When the water subsides the crushing is repeated, and the land again inundated. The decomposition of the leaves somehow or other "kills the salt", as the natives say. In fact, land that was thus treated for two successive years got so free from saline matter as to yield a very fair crop.

All parts of the plant are full of milk, which has powerful medicinal properties.

Calotropis procera, Dalz. & Gibs. Bby. Fl. 149.

Closely allied to the last, if not the identical species.

Met with in the arid places of the Deccan and Gujarát. The dried and powdered root bark is an excellent alterative, diaphoretic and in large doses an emetic, and is used in cutaneous diseases, especially leprosy. The supposed active principle extracted from this plant is called *mudarin*, and has the property of being soluble in water and coagulating by heat. Fibres are also extracted from this plant in Arabia. They are very strong.

Hoya viridiflora, Dalz. & Gibs. Bby. Fl. 153. *Dodi* or *hiran dori.*

A common creeper used as a substitute for rope to tie up bundles of firewood.

Hoya pendula, Dalz. & Gibs. Fl. Bby. 152.

Found in the Konkan and the hills about Nágotna. Both of these have excellent fibres.

Dæmia extensa, Dalz. & Gibs. Bby. Fl. 150. *Utarni.*

The commonest of Asclepids next to *Calotropis gigantea*, the roots of which are used in infantile diseases.

Holostemma Rheedii, Dalz. & Gibs. Bby. Fl. 148.

Common in the rains, when it runs up trees and hedges, the pods of which are eaten as a vegetable by the natives, who call the plant *shidodi*. The fibres are fine and silky, and are adapted for cordage and for paper manufacture.

BORAGINÆ.

In this order only one plant is found,

Cordia Rothii, Dalz. & Gibs. Bby. Fl. 174.

From the bark of this ropes are made.

URTICACEÆ.

To this order belongs the well-known

Cannabis Indica or **C. sativa**, Dalz. & Gibs. Bby. Fl. Suppl. 79. *Ganja* plant.

It supplies the hemp of commerce. It is cultivated throughout Hindustan, but principally at Nagar and in the peninsula, more on account of its leaves, stalks and flowers, wherein resides the intoxicating substance which furnishes *bháng* and *churrus,* and which the natives use in smoking and as a drink. The use of this resin is almost general, and in small doses is not hurtful to health. In Poona, beer, called *bhoja,* is manufactured from the grain of *jowári,* to which *bháng* is added in place of hops. The Indian method of cultivating the hemp plant, which consists in sowing the plants at great distances from each other so as to allow a large number of branches to come out, is not fitted for the production of good long fibre. Hemp was known to the ancients long before the birth of Christ. Pliny says that the Romans were well acquainted with it, and Hiero, king of Syracuse, rigged his ships with ropes made of this fibre. The plant flourishes best at elevations of 4 to 7000 ft., and the best fibre is obtained from the male plants, which are cut a month earlier than the females.

Girardinia heterophylla, Dalz. & Gibs. Bby. Fl. 238. *Awah.*

A large shrub, armed with long stinging bristles which produce intense pain on being touched.

Common in the plains and forests of India and Burma, but chiefly in the Himalayas. Yields a fine fibre used in Sikhim for ropes, twines and coarser cloths.

Debregeasia longifolia, Wedd.—*Conocephalus niveus,* Dalz. & Gibs. Bby. Fl. 239. *Kapsi.*

A tall shrub or small tree.

Common at Mahábaleshvar and the Konkan jungles. The inner bark yields a fibre which in Ceylon, etc., is used for cordage and fishing-nets.

Bœhemeria nivea, D. C. Prod. xvi. i. 206.—*Urtica tenacissima,* Dalz. & Gibs. Bby. Fl. Suppl. 78.

It grows spontaneously in Assam, where it is called *rhea* or *china grass,* and from which a fabric, called "grass cloth", is manufactured.

It was cultivated experimentally in many places, and during the administration of Lord Mayo the Government offered a prize of 50,000 Rs. for the best machine for extracting rhea fibre, and took other measures for extending the cultivation of this plant. The fibre is one of the best produced in the world, but difficult of preparation.

Splitgerbera scabrella, Dalz. & Gibs. Bby. Fl. 239.—*Sponia Wightii,* Dalz. & Gibs. Bby. Fl. 238.

From the latter plant, called *gol* in Bombay, the Garrows of Assam obtain a cloth with which they cover themselves.

Antiaris toxicaria, Lesch.—*A. saccidora,* Dalz. & Gibs. Bby. Fl. 244. *Chandul.*

Common on the ghâts and in Konkan, and from the bark of which sacs used to carry rice are made in a curious way. It yields also a good fibre which makes good cordage, and affords an excellent material for paper.

Morus Indica } Cultivated. Their bark is of a fibrous nature, **Fibrous Plants.**
M. alba. } well adapted for the manufacture of paper.

The twigs of *M. Indica* are, on account of their toughness and strength, employed in some parts of India in binding and tying bundles of fuel, loads, etc.

Ficus Bengalensis, Dalz. & Gibs. Bby. Fl. 240. *Vad* or *war*.

The bark and the aerial roots give a coarse fibre adapted for rope-making. The fibre is used by the Sikhs for slow-matches to their match-locks.

Ficus religiosa, Dalz. & Gibs. Bby. Fl. 21. *Pipal*.

It is said that paper for green umbrellas was made in Burma from the bark of this tree.

Ficus infectoria, Dalz. & Gibs. Bby. Fl. 241.

The inner bark yields a tough fibre good for rope. Many other plants of this order yield excellent fibre for cordage and as a material for paper.

SCITAMINEÆ.

This order furnishes us with the various species of the plantain, of which the ordinary table plantain is a well-known specimen. It is called

Musa paradisiaca or **sapientum**, Dalz. & Gibs. Bby. Fl. Suppl. 88.

The outer layers of the sheaths of the leaves yield a fine white fibre of considerable length and strength.

The ordinary method of obtaining the fibre is by scraping the sheathing footstalk of the leaf with a piece of iron and subsequently washing it to free it from pulp; but if the stem, previously cut longitudinally into four parts, is crushed between proper rollers, a much better quality of fibre can be had; each tree being calculated to yield about 4 lbs. of it. This fibre is fitted for conversion into straight ropes of considerable strength; a rope made from it sustaining 864 lbs. as against 924 lbs. borne by a similar one of pine-apple fibre. It can also be turned to use for making paper, as can also the combings. These combings make a good substitute for horse hair for stuffing purposes, etc. The peduncle or core can also be made to yield a half of it of stuff for paper-making.

Musa superba and **Musa ornata**, Dalz. & Gibs. Bby. Fl. 212.

These also contain fibre. These plants are known as *ran-kela*. Common over the slopes of Khandála and other gháts.

AMARYLLIDEÆ.

Agave Americana, Roxb. Fl. Ind. ii. 166.—*A. Cantula*, Dalz. & Gibs. Bby. Fl. 93. *Jungly annanas*.

From its leaves very tough and silk-like white fibres are procured which the natives of Malabár use for making ropes and cordage.

Fibrous Plants.

LILIACEÆ.

Sanseviera Zeylanica, Dalz. & Gibs. Bby. Fl. Suppl. 91. Bowstring hemp, *murgali, morwa.*

Wild and cultivated in Malabár, Konkan, Ceylon, etc.

The fibre is usually removed by either steeping the leaves in water till the pulpy part has become rotten and can then be easily separated, or the leaves being placed on a board are scraped with a rough stick or iron till all the pulp has come away. The best method appears to be the latter, which is the same as is followed in the case of the *Ananasa sativa.* The first-mentioned one yields a discoloured fibre in consequence of the fibres having to be steeped in water.

The fibre is pliant, soft and silky, and much resembles that of the pine-apple. It is used for making thread, twine, bow-string, ropes, etc., and stands a greater strain than even Russian hemp : a line made from it bearing a weight of 120 lbs., while a similar one of Russian hemp broke at 105 lbs. It is also sometimes used for making a fine class of cloth, and is considered very valuable for paper manufacture, for which last mentioned purpose it has been utilized at Trichinopoly.

Yucca gloriosa.

A native of America, but cultivated every where—in this Presidency and elsewhere—thrives well even in Mahábaleshvar. Has long sword-like leaves, terminating in a thorny point, and throws out a long flowering stalk surmounted by an ample panicle consisting of numerous (about 150-200) lily-like yellowish white flowers.

The fibre is 2-4 ft. long, rather wiry, fine, and strong; takes colour easily.

BROMELIACEÆ.

This order gives us the pine-apple.

Ananasa sativa or **Bromelia Ananas,** Dalz. & Gibs. Bby. Fl. Suppl. 94. Pine-apple.

From its leaves beautiful silky fibres are obtained. The process is extremely simple. The leaf is stretched on a board, and the epidermis removed with a blunt knife, when the long white fibres lying on the lower parenchyma, running in a longitudinal direction, are exposed. These are easily detached by means of a pin, and are fit for use.

A cloth from these is manufactured in the Philippines which equals, if it does not surpass, the finest muslins and cambrics. The fibres are very strong, and are not injured by immersion in water. In the Southern Marátha Country, at Goa, and along the coast of Malabár, the natives use a string made from them for stringing gold ornaments and pearls.

PANDANACEÆ.

This order is represented by only one plant,

Pandanus odoratissimus, Dalz. & Gibs. Bby. Fl. 279.

This is the well-known and much used *keura* of the natives, an elegant shrub 6-10 ft. high, roots fusiform, issuing from the stem. Leaves 3-5 ft. long, at the extremities of the branches, drooping, smooth and shining; margins and back armed with sharp spines.

Flower bracts light-yellow, very sweet-scented, fruit like a pine-apple and orange-coloured. Fibrous Plants.

The fibres are obtained from the leaves which are cut for this purpose every second year. Each plant yields enough fibre to make two bags. In the Mauritius, sugar and coffee are packed in these bags, 140 lbs of sugar are put into each bag, which never bursts, although holding so great a weight. The floral leaves are eaten either raw or boiled. The lower pulpy part of the drupes is eaten by the natives in times of scarcity. The roots are used by basket-makers to tie their work with, and being spongy they make a substitute for corks The fibres are said to be also good for making paper, and the natives use them for the manufacture of a fine kind of mat to sleep upon An oil prepared from the roots is employed in rheumatism.

PALMÆ

This order, to which the well-known cocoanut and date palm belong, also supplies very tough, durable and elastic fibres

Cocos nucifera, Dalz & Gibs Bby. Fl. 279 *Maar,* cocoanut.

Produces all our coir, which is used for a variety of purposes.

Caryota urens, Dalz. & Gibs. Bby Fl. 285. *Birli-maar.*

Common all over the Konkan, and supposed by some to be a native of Ceylon; also yields very strong fibres. They are obtained from the long flower-stalks, and ropes made from them are so strong that they are used for securing wild elephants, fishery lines are made from them.

Borassus flabelliformis. *Tar* or *tad*

The leaf fibres, which are about 2 ft in length, are used in some parts of the Madras Presidency for making ropes and strings The fibre round the nut is said to be suited for paper, but the supply of it would be small.

Phœnix sylvestris *Khajuri.*

Bags, basket work and mats are made from the leaves, and the footstalks of which are converted after being beaten into well ropes. The fibres are plentiful, soft, bleach well, and are very well adapted for the use of paper-makers A free supply can always be obtained.

Areca catechu.

The nut is imbedded in a covering of coir, consisting of three layers, the middle one of which is woody and coarse, the other two are fine and soft, and it is believed might be utilized for paper.

GRAMINEÆ.

Saccharum spontaneum, Dalz & Gibs. Bby. Fl. 304.

Common in every part of India. In Sind it is abundant, and grows to be a tall grass about 3-15 ft. high. It is also found on the banks of the Deccan rivers and in Domus. It is distinguished from the other varieties by its wavy feathery flowers which have a silky whiteness. The culms are made into native pens, brooms, and the leaves after being deprived of their soft parts are used to make

Fibrous Plants.

strings of. The whole plant is sometimes employed for thatching. It is also used as fodder.

Saccharum mimja is a tall grass which is found throughout India; and principally in the Punjab, where it covers large tracts of land, and often encroaches upon cultivated ground.

The part of the plant which is most useful is the flower-stalk, which, after being deprived of its sheath and spathe and cut as high up as it remains of a uniform thickness, is made into chicks, the upper and tapering part being employed to form "sirki". The thin stalk-ends arranged side by side are bound together with grass, forming a species of matting, which, besides being employed for the ordinary purpose of giving shelter to carts, etc., is also used for thatching. The sheaths and spathe when reduced to shreds supply a material much used in making strings and ropes. This string or twine is reported to be of excellent quality and cheap; while the rope, which is very strong, is employed for rigging boats, and as a tow line on the Punjab rivers, as it does not deteriorate by being kept constantly wet. It is also used for Persian wheels and well ropes. The refuse yields a paper stuff, from which a very fair, almond-coloured, paper has been made; and as the grass grows in abundance and thickly every where, especially in Upper India, it may be said to supply an almost unlimited stock of stuff for paper-making; in fact, all the species of *Saccharum* are more or less adapted for the manufacture of paper.

BAMBUS.

The various varieties of the bambu, such as *Dendrocalamus strictus, Arundinaria Wightiana, Bambusa arundinacea*, etc., are to be met with wild or cultivated in almost every part of India growing to an enormous height of 60-70 ft. and even more in moist alluvial lands, and near places where water is abundant. They propagate themselves by throwing outshoots, of which a single bambu produces as many as 10 to 20 a year. Three-fourths of these might be cut down each year without causing injury to, or bringing about the death of the parent shoot, which can thus be made to reproduce itself for many successive years.

The uses of the bambu are multifarious and too well known. Leaving every one of these aside, the grass is one that has latterly attracted considerable attention as a substitute for the esparto and alpha grasses in the manufacture of paper. Experiments conducted by Mr. Routledge, a well-known name in connection with the paper trade, tend to show that, in economy of production and quality, no other article approaches the bambu as a source of paper-supply, and its rapid growth establishes it at once as furnishing an unfailing supply of raw material. Another advantage which the bambu possesses is that being an endogen, it does not call for any elaborate manipulation such as that which is needed in exogenous plants, to separate the fibre from the woody stem-bark and other extractive matters; all that is required being to crush the sufficiently young bambus, previously split into halves, between proper rollers, dry them of their moisture, of which they hold between 60 to 75 per

cent., and pack them for export or local use. An acre of ground which yields about 40 tons of stems can thus be made to represent 10 tons of dried produce. The stem proper for crushing are such as have, at least, one full season's growth, as in the very young ones the fibre is not sufficiently mature, and in old ones it is much too woody. The crushed material prepared in the manner just described only requires soaking down and bleaching to fit it for pulping and conversion into paper. **Fibrous Plants.**

The best variety of bambu for paper manufacture is that which grows the fastest and has the longest space between the joints. These joints have to be removed and rejected; hence the greater their number the greater the wastage. In planting the bambus they ought to be sown close, so as to make the stem shoot upwards, thus securing a finer fibre with longer joints.

DYES.

In the Bombay Presidency the vegetable kingdom yields a good many dyes. Some of these and the modes of fixing them are pretty generally known; certain remote villages, however, produce dyes which are not met with, and the methods for fixing which are not understood elsewhere.

BIXINEÆ.

Bixa orelana, Dalz. & Gibs. Bby. Fl. Suppl 5. *Kisri, sendri.*

A native of South America, naturalized in India.

The pulp covering the seed contains the dye known under the name of *arnotto*. This dye is orange-red, and is obtained as follows. The pods are marcerated for a week or more in boiling water, the seeds extracted, and the pulp left to subside. The liquor is then passed through sieves into proper vessels, and again boiled till it throws up a sort of scum, which holds the colouring matter. This scum, which is carefully removed from time to time, is now subjected to a further process of boiling, until it acquires sufficient consistence to be manipulated into balls or cakes, in which state the dye is fit for sale or the dyer's use. A better proceess, and one that is certainly less injurious to those engaged in the manufacture of this article, consists in washing the seeds of arnotto, on the surface of which the colour lies, thoroughly, and precipitating the colour by means of vinegar or lemon juice. This precipitate might then be removed and manipulated as already explained.

Arnotto does not appear to be much used in dyeing silk and woollen fabrice; on cotton, however, several beautiful shades are produced from it. In Sambalpur, in the Central Provinces, cotton cloths are dyed with it of a nice salmon colour, which, however, is not fast, and does not stand many washings. In Assam it produces a fleeting yellow. It is said that by the use of alkaline mordants the colour might be fixed on silk and wool. Several other uses are made of arnotto. It is employed, for example, to give butter, cheese, oils, etc., a yellow tinge, and milkmen sometimes colour buffalo milk with it to pass it for cow milk.

TAMARISCINEÆ.

1 **Tamarix gallica** or **T. Indica,** Roxb. Fl. Ind. ii. 100. *Jhau, lai.*

A small tree or tall shrub common in Sind, Cutch, throughout India, Ceylon and Burma on the banks of rivers; also in Africa and Southern Europe.

T. dioica, Roxb. Fl. Ind. ii. 102. *Sarru, laljhau, pichula.* Dyes.

A small tree common in the beds of rivers in the Deccan and Konkan, and found from Sind and the Punjab to Assam and Burma.

T. articulata, Hook Fl. Ind. i. 249.

Common in Sind, Punjab, etc.

The galls of all the above varieties are known as *máy* or *barri máy*, and are produced by the puncture of an insect which generally burrows in the branchlets. They are not used as dyes by themselves, but are employed as a mordant by tanners, calico-printers and dyers. Madder-dyed cloths have the colour fixed through their agency. Prepared with salts of iron these galls are employed to dye black.

GUTTIFERÆ.

Garcinia purpurea, Dalz. & Gibs. Bby. Fl. 31. *Kokam.*

The acid juice is used as a mordant by people working in iron.

G. xanthochymus, Hook. Fl. Ind. i. 269.—*X. pictorius*, Dalz. & Gibs. Bby. Fl. 31. *Tamal, dampol.*

From the full-grown, but not ripe, fruit a quantity of creamy, resinous, yellow, gum-like gamboge is obtained which makes a tolerably fair water colour which might be used either by itself or to mix with blue to form green. The water dissolves a larger quantity of gum if a little alkaline salt be added to it.

G. Cambogia, Roxb. Fl. Ind. ii. 621.

The fruit, like that of the preceding, yields a yellow juice, an inferior sort of gamboge.

Ochrocarpus longifolius or **Calysaccion longifolium** Dalz. & Gibs. Bby. Fl. 32 *Suringee.*

The tree grows in Káládgi, Sholápur and Belgaum districts where its bark and root are used, and also exported to Ahmednagar for colouring red. Enormous quantities of this dye are used in Surat and Kaira also. It was believed by some that *nagkesar* (the flower buds) was employed for dyeing silk; but this is doubtful.

BURSERACEÆ

Garruga pinnata, Dalz. & Gibs. Bby. Fl. 312. *Kurak.*

MELIACEÆ.

Melia azadirachta, Dalz. & Gibs. Bby. Fl. 36. *Nim.*

Cedrela toona. *Tun.*

The white fragrant flowers boiled in water till one-fourth of the latter has evaporated, yields a yellow dye into which the cloth is simply dipped, and then squeezed to give it a fleeting yellow colour. Various shades ranging from light to deep yellow are thus produced, the mordant sometimes employed with them being alum. A red dye is obtained from the seeds. A sulphur yellow is sometimes

Dyes.

produced by mixing tun flowers *(C. toona)* 4 oz., with turmeric 2 oz., lime 2 oz., and acidulated water.

RHAMNACEÆ.

Zizyphus jujuba, Dalz. & Gibs. Bby. Fl. 49. *Bhor.*

Z. xylocarpa, Dalz. & Gibs. Bby. Fl. 49. *Gutti.*

Ventilago Madraspatana, Dalz. & Gibs. Bby. Fl. 48. *Lokandi, kanyeil.*

Common on the ghtás. From the root bark a beautiful chocolate dye is extracted. It is usually mixed with the root of *Hedyotis umbelata.* Added to galls a black dye is produced.

Buchanania latifolia, Dalz. & Gibs. Bby. Fl. 52. *Pial, charoli.*

Odina Odier, Dalz. & Gibs. Bby. Fl. 51. *Shemti.*

Semecarpus anacardium, Dalz. & Gibs. Bby. Fl. 52. *Biba, bilambi.*

This is used for producing a black colour which is not removed even by alkalies. It is, however, a caustic, and has, therefore, to be mixed with various other substances to modify its action.

LEGUMINOSÆ.

Indigofera tinctoria, Dalz. & Gibs. Bby. Fl. 59. *Nib.*

A shrub, 4-6 ft. high, faintly silvery white. Leaves pinnated, 1-2 in. long; leaflets 9-13 oblong ovate, turning blackish when dried. Flowers reddish-yellow. Legumes 1 in. long, approximated towards the base of the peduncle, slightly curved upwards.

Found wild in the Konkan and elsewhere, but generally cultivated, especially in Bengal, North-West Provinces and Madras, on account of the indigo it yields.

The blue dye indigo is too well known to require any description, and various methods are employed for extracting it, all of which, generally speaking, consist in macerating the leaves in water and oxidising the liquid by agitation and exposure to the air.

Indigo by itself produces a fast dye; but every colour in the production of which it enters, is not necessarily fast, the fastness of the colour depending upon the nature of the other dyes used. Several shades are produced by the agency of indigo, such as blue in all its shades and blends, and various blends of green; the dye first applied giving the prevailing tint.

All sorts of textile fabrics can be dyed by the agency of indigo. Mordants, properly so called, are not needed to fix the colour if simple blue is used; whenever such are employed, their action is called into requisition for the purpose of clearing the colour. The native method of dyeing blue consists in simply dipping the cloth into a solution of indigo and then squeezing it, and allowing it to dry. The oftener the cloth is dipped into the liquid, the deeper the shade of colour produced.

Two other plants described elsewhere produce a sort of indigo, viz., *Wrightia tinctoria* and *Crosophora plicata.*

Butea frondosa, Dalz. & Gibs. Bby. Fl. 71. *Pallas*. Dyes.

The bright scarlet flowers of this tree, infused either fresh or dry in water holding alum, or alum and tartar in solution, are employed for dyeing a beautiful bright yellow. The dye known in Gujarát as *kissu* may be extracted by simply pressing the flowers when fresh, or boiling them when dry in a weak solution of lime-water, but it is not permanent.

From wounds in the bark a ruby-coloured astringent gum exudes, which loses colour by exposure, but it may be preserved by the gum being closely locked up in a bottle.

B. superba, Dalz. & Gibs. Bby. Fl. 71. *Pallas yel.*

A gigantic climber; leaflets membranous, the terminal 6-20 in. long, lateral oblique, smaller. Flowers orange-coloured, larger than those of the preceding, in racemes 1 ft. long.

Found in Northern Konkan, Circár mountains, Travancore, Bengal, Oude, North-West Provinces, Burma, Pegu, etc.

A yellow dye is obtained from the flowers, and from incisions in the bark a kino-like substance exudes.

Petrocarpus santalinus, Dalz. & Gibs. Bby. Fl.

The wood contains a red colouring matter, called santalin, which, though insoluble in water, is readily dissolved out by the alkalies producing a lasting dye. For dyeing cloth, however, a decoction of the wood is prepared into which the cloth is dipped. In Europe the dye-stuff is employed by pharmaceutists as a colouring agent, and also for dyeing leather red.

Cæsalpinia coriana, Dalz. & Gibs. Bby. Fl. Suppl. 27. *Libi.*

This beautiful tree, indigenous in the West Indies and Central America, was introduced into India by Dr. Wallich, and is now cultivated in Bombay, Poona and elsewhere. The pod contains a large quantity of tannin which is a valuable material for tanning. The average yearly produce from a single tree in the West Indies is said to be 100 lbs.

C. sappan, Dalz. & Gibs. Bby. Fl. Suppl. 27. *Bakkam, patang.*

The wood, broken into chips and boiled, yields a red dye which in the dry state is called *gulál*, and is imported into Bombay from Rájápur. In Rájápur it is prepared from wood imported from the Malabár Coast. Some of the dye imported into Bombay finds its way to Násik, where it is used for dyeing cotton thread. To dye cloth, the wood has to be soaked in water with lac and alum for two days and then boiled. This *sappan* decoction gives a fast colour. In the North-West Provinces sappan wood is employed in calico-printing.

Cassia auriculata, Dalz. & Gibs. Bby. Fl. 81. *Tarwar.*

C. tora, Dalz. & Gibs. Bby. Fl. 81. *Tacla.*

The seeds of this plant are used in dyeing with indigo, their action being supposed to be that of starch in the indigo solution.

Dyes.

Acacia Arabica, Dalz. & Gibs. Bby. Fl. 86. *Babul.*

This tree yields catechu, or *kath* as it is called by the natives. Kath produces various shades of brown, and is also employed as a mordant in conjunction with other colouring stuffs. It is also eaten by the natives with *pan* and betel-nut.

For preparing catechu, after the proper tree has been selected, cut down, and the wood broken to pieces, boil the pieces in water till it assumes a port-wine colour, and set the water to cool. Hang a quantity of leaves or twigs into this water, and the catechu will coagulate on them.

A. suma, A. catechu, Dalz. & Gibs. Bby. Fl. 86. Also *A. sundra.*

All these produce catechu, and are used in much the same way and for the same purposes as the preceding.

Albizzia procera, Dalz. & Gibs. Bby. Fl. 87. *Kinye.*

RHIZOPHOREÆ.

Brugueiria gymnorhiza vel **Rheedii,** Dalz. & Gibs. Bby. Fl. 95. *Kankra.*

COMBRETACEÆ.

Anogeissus (Conocarpus) latifolius, Dalz. & Gibs. Bby. Fl. 91. *Dhaura.*

Terminalia catappa, Dalz. & Gibs. Bby. Fl. Suppl. 33. *Bengali-baddam.*

T. bellerica, Dalz. & Gibs. Bby. Fl. 91. *Bherda, goting.*

T. chebula, Dalz. & Gibs. Bby. Fl. 91. *Hirdá.*

T. tomentosa, Dalz. & Gibs. Bby. Fl. 91. *Ain.*

T. paniculata, Dalz. & Gibs. Bby. Fl. *Kinjal.*

All the above species are more or less employed in dyeing. *T. catappa* is the Indian almond tree, the astringent bark and leaves of which yield in combination with salts of iron a black pigment from which Indian ink is made, and with which the natives sometimes colour their teeth.

The nut of *T. bellerica* also furnishes ink, and besides its medicinal use is employed in tanning and dyeing cloth and leather.

The *hirdá* is by far the most important of the *terminalias.* The bark is boiled, and the decoction employed as a mordant in dyeing, as also for curing or tanning leather. The fruits are used to make ink. Mixed with alum they produce a very durable yellow dye which is much esteemed by chintz-painters and carpet-weavers. An equally good black dye is produced by acting upon the fruits with mud containing iron, and this dye is used by harness-makers as well as by dyers. The outer coat of the fruit produces with ferric sulphate a fine durable black colour, as does also the nut enclosed in it. This last mentioned is extensively used in ink-making, tanning and dyeing, and large quantities of it are annually exported from this country.

The barks of the remaining two *terminalias* also contain tannin, and both are employed in dyeing black. The fruits of both varieties are myrabalans. Dyes.

MYRTACEÆ.

Eugenia jambolana vel **Syzigium jambolanum,** Dalz. & Gibs. Bby. Fl. 93. *Jambul.*

MELASTOMACEÆ.

Memecylon edule, Dalz. & Gibs. Bby. Fl. 93. *Anjan.*

A large shrub; branches round. Leaves ovate or oblong, 1-2 in. long, green and shining above, paler underneath, 1-nerved. Peduncles axillary, and below the leaves in older branches bearing an umbel-like cluster of small flowers of a beautiful purple. Fruit globose, smooth, about 3-4 lines diam., crowned by the 4-toothed limb of the calyx.

Very common every where in the ghâts and plains.

An infusion of the leaves in cold water yields a yellow colouring matter which becomes deep-red with the addition of myrabalans and sappan wood. Both dyes are employed in giving colour to cloths and mats.

Melastoma Malabaricum, Dalz. & Gibs. Bby. Fl. 92.

A shrub about 3 ft. high, more or less clothed with hairs or bristles; branches 4-angled, ultimate ones compressed. Leaves elliptic-oblong, 3-6 in. long. Flowers usually about 5-11 in terminal cymes, rose-coloured, handsome, large. Fruit nearly globular, small. Seeds embedded in a purple pulp.

Found in Southern Konkan. The fruit is eatable, and yields a purple dye used for cotton-cloths.

LYTHRACEÆ.

Woodfordia floribunda vel **Grislea tomentosa,** Dalz. & Gibs. Bby. Fl. 97. *Dhauri, dhayati.*

A shrub. Leaves 2-4 in. long, lanceolate, hoary underneath, and having numerous small black glands. Flowers in axillary clusters, handsome red.

Common in our ghâts. From the leaves and twigs a yellow colouring matter is extracted, used sometimes by calico-printers; the petals furnish a red dye which does not appear to be known outside of India.

Lawsonia alba (inermis), Dalz. & Gibs. Bby. Fl. 97. *Mendi.*

This very common plant yields an orange-red dye which is easily obtained by macerating the leaves in water; mixed with alum this colour becomes permanent. It is employed for dyeing cloths, and forms a hair-restorer, the addition of indigo being needed to make the hair black. The triturated leaf is employed for staining red the nails, palms of the hands and soles of the feet. Acids destroy the colour.

Lagerstrœmia parviflora, Dalz. & Gibs. Bby. Fl. 98. *Nana bondarah.*

Dyes.

Punica granatum, Dalz. & Gibs. Bby. Fl. Suppl. 34. *Dalim, anar.*

The rind of the fruit, particularly the wild one, boiled in water until the latter is reduced to one-fourth, yields a green decoction into which the cloth has to be simply dipped to colour it. But it is as a mordant that the rind is more generally used, being for this purpose always boiled along with the other dye with which it is employed.

A light-red dye is obtained from the flowers, which, however, does not seem to be much used. The bark is said by some to be useful for tanning, and to be employed in dyeing Morocco leather.

RUBIACEÆ.

Hymenidictyon excelsum, Dalz. & Gibs. Bby. Fl. 117. *Karwah.*

Morinda citrifolia; **M. tinctoria** and their varieties; **M. bracteata**; **M. tomentosa**; **M. exerta**, etc.—Dalz. & Gibs. Bby. Fl. 114. *Aal, bartundi, madar.*

Wild and cultivated in Bombay, Madras and throughout India.

The barks of all the above varieties yield a beautiful red dye which is obtained by bruising and boiling them in water; the root bark produces the best dye, with which alum is generally employed as a fixing agent. A bright yellow colour is said to be prepared from the wood in Bengal. In Ahmednagar a scarlet dye is obtained from the root bark, and is used for dyeing handkerchiefs, turbans, etc. It is also used to mix with other more expensive red dyes employed in colouring cloth and yarn. The red thread of carpet-makers is entirely dyed with it. In Madras turbans are coloured with this agent.

Rubia cordifolia, Dalz. & Gibs. Bby. Fl. 121. *Manjet, madar.*

This yields a colour that is much brighter, though not so durable as the madder of Europe. Being, however, very expensive, its use is entirely restricted to Farakabad and Bareilly.

COMPOSITÆ.

Carthamus tinctorius, Dalz. & Gibs. Bby. Fl. Suppl. 45. *Kassumba,* safflower.

Cultivated throughout India for the sake of the oil which is extracted from the seeds, and the dye obtained from the flowers. To obtain the dye the flowerets are gathered immediately on opening without being allowed to expand fully, and dried in the shade. After they are dry, water is poured over them, and they are made into lumps. These lumps are next placed on a mat-strainer, and a man treads them with his feet while water is slowly poured over the pulpy mass. The result of this process is the removal of the yellow colouring matter (which runs down) from the flowers, while the residual mass, which is made out into flat circular cakes and dried in the sun, constitutes the safflower of commerce.

Safflower is used to dye silk and cotton cloths is nearly every part of India. It yields a number of shades of red, such as pink, scarlet, crimson, and is employed with other ingredients to produce the various series of oranges, purples, mauves, etc. All these colours are, however, very fleeting, and will not stand any washing, unless fixed by some mordants. The mordants more generally employed are the berry of *Ziziphus jujuba* and the carbonate of soda. The best safflower is said to be that from Dacca; that procured in Bombay is inferior. Dyes

The cultivation of the *Carthamus tinctorius* is very expensive and unremunerative if carried out by itself; it is, therefore, almost always grown as a subordinate crop along with barley, gram, etc., to which last the cultivator looks for his profits.

Tagetes patula, Dalz. & Gibs. Bby. Fl. Suppl. 46. *Gul-jafri,* French marigold.

Cultivated extensively for the sake of the flowers, which are used by the natives in their temples, and worn in garlands by women round the neck and head. The flowers yield a yellow dye of inferior quality used by the poorer classes of some parts of India for dyeing their coarse cloths. The dye is extracted by soaking the flowers in water and squeezing them with the hands.

STYRACEÆ.

Symplocos racemosa vel **Hopea racemosa,** Dalz. & Gibs. Bby. Fl. 140. *Lodhra, lodh.*

Common at Mahábaleshvar and other ghâts.

From the bark and leaves a yellow dye is extracted, which is used for mixing with madder. Its action appears, however, to be more that of a mordant than of a pure colouring agent, and, as such, it is used by the calico-printers and dyers in Calcutta.

An allied species—*S. paniculata*—found in the Himalayas yields a brownish or dark-bluish colour.

OLEINEÆ.

Nyctanthes arbortristis, Dalz. & Gibs. Bby. Fl. Suppl. 51. *Parijatak.*

The flower stalks yield a fine, but fleeting, buff or orange colour. To extract the dye the dried flowers are boiled in water, 1 lb. of flowers requiring 10 gallons of water, which are evaporated till only one gallon is left; the cloth is then dipped into the liquor and hung out to dye. Five yards of muslin can thus be dyed with 1 lb. of flowers. Silk also takes the colour very well.

But, besides being used by itself, the dye is often compounded with red, and produces rich flame, orange and salmon colours.

The bark is employed for tanning.

APOCYNACEÆ.

Wrightia tinctoria, Dalz. & Gibs. Bby. Fl. 145. *Kala-kuda.*

Dyes.

From the leaves and young shoots a blue dye—indigo—is extracted.

W. tomentosa, Dalz & Gibs. Bby. Fl. 145. *Kala-inderjao.*

The remarks about the foregoing apply to this also.

BORAGINEÆ.

Cordia myxa, Dalz. & Gibs. Bby. Fl 173. *Bhokar, bargund.*

It is said that in Otaheite the juice of the leaves is used in dyeing.

BIGNONIACEÆ.

Ouroxylon Indicum vel **Calosanthes Indica,** Dalz. & Gibs. Bby. Fl. 161. *Tintun.*

The bark and fruit are used in dyeing and tanning.

ACANTHACEÆ.

Adhatoda vasica, Dalz. & Gibs Bby. Fl. 194 *Adussa.*

The leaves yield a more or less durable yellow colour which is used by some people to dye coarse cloths with. Mixed with indigo a beautiful dark blue-green is obtained The colour is obtained by boiling the leaves in water (10 lbs. to 16) slowly for a long time till half the water has evaporated.

VERBENACEÆ.

Tectona grandis, Dalz. & Gibs. Bby. Fl. 199. *Sal.*

Avicenia officinalis, Brand. For. Fl. 371.

EUPHORBIACEÆ.

Euphorbia Tirucalli, Dalz. & Gibs. Bby. Fl. Suppl. 76. *Nival.*

Common in hedges.

This is not a dye-producing plant properly so called, but the ashes of the burnt plant are used as an alkali in dyeing in certain parts of India, principally in Southern India.

Jatropha curcas, Dalz & Gibs Bby. Fl. Suppl 77. *Jepal.*

The oil extracted from the seeds and boiled with oxide of iron often forms a varnish used in China for covering boxes (Lindley).

Mallotus Philippinensis vel **Rottlera tinctoria,** Dalz. & Gibs. Bby. Fl. 230. *Shendri, kapela, kamala.*

The bark of the tree is used for tanning.

The reddish-yellow powder which covers the ripe fruit is brushed off and collected, and wants very little preparation before being used; all that is needed being to mix it with water holding in solution half its weight of carbonate of soda. Silk dipped into this takes a fine yellow colour, and cotton cloths may also be similarly dyed. Alcohol and ether dissolve the colouring matter with facility. The dye is in some places mixed with other substances to produce various shades of red, orange and brown. In Ahmedabad a deep orange colour is produced by mixing it with lime water, alum and turmeric or safflower.

Briedelia retusa, B. montana, Dalz. & Gibs. Bby. Fl. 233. *Phatarphod, assana.* **Dyes.**

Crosophora plicata, Dalz. & Gibs. Bby. Fl. 232.

An annual, erect, hoary plant, common in Bombay, Deccan and Gujarát.

The juice of the green capsules imparts to wet cloth a beautiful blue colour similar to that of indigo.

Phyllanthus emblica, Dalz. & Gibs. Bby. Fl. *Aola.*

Preticulatus Anisonema multiflora, Dalz. & Gibs. Bby. Fl. 234. *Kalla Mahomed.*

A large climbing shrub with numerous twiggy branches; floriferous branches angular. Leaves about 1 in. long, ovate, membranous. Flowers aggregated, axillary, several males and 1 or 2 females in a cluster; of a purplish colour. Berry succulent, somewhat depressed, size of a pea, dark-purple. Very common. Ink is sometimes made from the fruit.

URTICACEÆ.

Artocarpus integrifolia, Dalz. & Gibs. Bby. Fl. 244. *Phanas.*

A. Lakoocha, Dalz. & Gibs. Bby. Fl. 244. *Watamb.*

MYRICEÆ.

Casuarina equisetifolia, Dalz. & Gibs. Bby. Fl. Suppl. 82

The bark contains tannin.

A dye was prepared from it some years ago and shown at the Madras Exhibition of 1855. It gave a reddish nankeen with alum, and with iron a black colour. Exposure to the air also produced a stable nankeen red.

SCITAMINEÆ.

Curcuma longa, Dalz. & Gibs. Bby. Fl. Suppl. 87. *Halad.*

Besides being used in various religious ceremonies, in medicine, and as a condiment by the natives, the tubers of turmeric are employed as a colouring agent by dyers throughout India, being used either by itself or with other dyes to produce various shades of yellow and other colours. The colouring agent is curcumin, which is freely taken up by ether and alcohol, and which is changed to a deep red or brown by alkalies. The colour of turmeric is not always fast, even when used with mordants; still it is extensively employed in dyeing, not only cotton cloths, but also silk and woollen fabrics,—carbonate of soda and alum being the mordants more generally used along with it.

GUMS AND RESINS.

BIXINEÆ.

Cochlospermum Gossypium, Hook. Fl. Ind. i. 90. *Kumbi, kathalya.*

A small tree, trunk erect. Leaves scattered about the ends of branchlets, palmately 3-5-lobed, 3-8 in. long. Flowers golden-yellow, 4-5 in diam. Capsules oval, nearly the size of a goose-egg, 5-valved; seeds numerous, enveloped in a soft silky wool.

Deccan, but planted everywhere. It yields the *kutcera* gum used as a substitute for tragacanth. The cotton is of no value, except for stuffing pillows. The timber is soft, and only used as firewood.

ANACARDIACEÆ.

Spondias mangifera, Dalz. & Gibs. Bby. Fl. Suppl. 19. *Ambára, rhan amb.*

A small tree. Leaves near the extremities of branches, 1-1½ ft. long; leaflets 4-6 pair, 2-9 in. long by 1-4 in. broad. Flowers small, greenish-white in long panicles. Drupe ovoid, 1½-2 in. long, yellow when ripe; kernel tough, fibrous outside.

Wild, and cultivated throughout India. It yields an insipid gum. The ripe fruit has an astringent acid taste, and is eaten, while the raw one is pickled. The wood is soft and brittle, and only used as fuel.

Bombax Malabaricum. *Saur, saer.*

Sterculia villosa. *Gul-kandar.*

,, **urens.** *Kandul, katiri.*

,, **gutata.** *Kukar* and *goldar.*

Feronia elephantum. *Kowta.*

Canarium strictum. *Dhup, gugal.*

Zizyphus jujuba. *Bhor.*

Mangifera Indica. *Amb.*

Anacardium occidentale. *Káju.*

Buchanania latifolia. *Pial.*

Odina Woodier. *Shimti.*

Holigarna Arnottiana. *Bibu.*

Semecarpus anacardium. *Biba.*

Butea frondosa. *Pallas.*

,, **superba.** *Pullas yel*

Ougeinia Dalbergioides *Tiwas, tiwar*

Pterocarpus marsupium. *Bibla.*

Anogeissus latifolius. *Dhaura.*

Terminalia belerica. *Bherda.*

Gardenia lucida. *Dikamali karunga.*

Mimusops elengi. *Buckhul* and *wowli*

Sponia Wightia. *Gol* (*Portulaca oleracea* is also known by the name of *gol*).

See Chapter on Timber Trees for the description of these and of other trees.

VEGETABLE SOAPS.

Sapindus trifoliatus, S. emarginatus, and **S. laurifolius,** Dalz. & Gibs. Bby. Fl. 34, 35. *Rhita.*

The fruit when rubbed with water has the property of making the latter soapy, and is extensively used for cleaning cloths, boards, etc.

The fruit of *S. Mukorossi*, described by Roxb. ii. 280 under the name of *S. detergens*, said to be wild in Kumaon and Silhet and cultivated throughout the North-West Provinces and Bengal, is saponaceous, and is used for the same purpose. It is said that the fruit of *Dittelasma rarak*, belonging to the same order and described by Loureiro as *Sapindus saponaria*, is also saponaceous.

Acacia Arabica, Dalz. & Gibs. Bby. Fl. 86.

A decoction of the bark is a substitute for soap.

Acacia concinna, Dalz. & Gibs. Bby. Fl. 87. *Sikhakai.*

A large climber. Branchlets, petioles and peduncles grey-downy and armed with numerous, minute, recurved prickles. Petiole 3-4 in. long with a large gland below the first pair of pinnæ, and 1 between the uppermost pair; pinnæ 12-16, 2-3 in. long; leaflets 30-50, ¼-½ in.; membranous, linear, sensitive, with an oblique mid-rib, glabrescent, stipules large, cordate-ovate. Flower bud purple; flowers yellow in globose heads ¼-½ in. diameter arranged in racemose panicles. Pod thick, succulent, straight, when dry shrivelled, 3-4 in. by ¾-1 in. long, 6-10-seeded, slightly contracted between the seeds.

This shrub is common over the ghâts and in the plains. The pod is very much used as a substitute for soap.

Randia dumetorum, Dalz. & Gibs. Bby. Fl. 119. *Ghela.*

Common everywhere.

The fruit is used instead of soap by the hill-people, but is said to destroy cloths.

WATER-CLEARING NUT.

Strychnos potatorum, Dalz. & Gibs. Bby. Fl. 156. *Nirmali.*

The seeds are used for clearing muddy water: they are rubbed on the sides of the earthen vessel containing the muddy water; within a short time the mud subsides, leaving the water clean.

At a time when filters were not in use, and means of communication difficult, Europeans also resorted to this mode of clearing water.

Vegetable Soaps.

Phyllanthus emblica, Dalz. & Gibs. Bby. Fl.

Chips of the wood thrown into muddy water assist in clearing it. The wood of this tree is frequently used for well-curbs, etc.

MEDICINAL PLANTS.

THERE are in the Konkan numerous medicinal plants, some of which possess very active properties, and are officinal in the Indian Pharmacopœia. A few shall be mentioned here, arranged in groups according to their properties.

PURGATIVES.

Argemone Mexicana.

The oil acts as a mild laxative in ½-drachm doses. (*See* Chapter on Oils.)

Cassia fistula, Dalz. & Gibs. Bby. Fl. 80.

Common in the hilly parts of the Konkan, and also planted. The part used is the pulp, in 1 to 2 drachm doses. It acts as a mild purgative, and briskly in 1 to 2 oz. doses.

Cassia alata, Dalz. & Gibs. Bby. Fl. Suppl. 29. *Dad-mardun.*

A handsome shrub with long pinnate leaves, conspicuous, erect racemes of yellow flowers and winged pod. Found in gardens. The parts used are the leaves: a tincture of the dry leaves acts in the same way as senna, and the extract from fresh leaves is analogous in its action to colocynth.

The leaves of *C. sophora; C. occidentalis (hikal);* and *C. tora (takla),*—all very common, are used by natives as mild laxatives.

Clitoria ternatea, Dalz. & Gibs. Bby. Fl. 68. *Gokarna mul.*

Stem twining. Leaflets 2-3 pair. Flowers large, blue or white. Legume linear, compressed, straight, many-seeded.

Very common in hedges and cultivated in gardens. The seeds of this elegant plant possess purgative properties; they are roasted, powdered and administered in drachm doses. Dr. Dymock advises the administration in combination with twice their bulk of acid tartrate of potash. The root has purgative and diuretic properties assigned to it.

Tamarindus Indicus, Dalz. & Gibs. Bby. Fl. 80.

The pulp of the fruit. (*See* Chapter on Timber Trees.)

Citrullus colocynthis, Dalz. & Gibs. Bby. Fl. 101. Bitter cucumber or colocynth plant; *kaddu kankri, indrayeen.*

Found in the Deccan, Gujarát and sparsely in the Konkan. From the fruit of this plant compound extract of colocynth was formerly prepared in large quantities at Hewra for the supply of the medical stores. It is

a hydragogue cathartic. The dose of the pulp is from 2 to 8 grs., that of the compound extract from 3 to 10 grs, and of the compound pill from 5 to 10 grs.

Cucumis trigonus, Dalz & Gibs. Bby. Fl. 103. *Kavitha*; also called *indrayeen.*

Common in the Deccan. The bitter pulp of the fruit of this plant is said to possess the purgative properties of the last.

Ipomœa hederacea, D. C. Prod. ix. 313 and 341. Generally known as *pharbitis nil; kala dana.*

A tall herbaceous twiner. Leaves 1½-4 in. long, broadly cordate, more or less 3-5-lobed, the middle one larger. Flowers blue or purple, often about 2 in. long.

Common throughout India and cultivated in gardens on account of its flowers. The officinal parts are the seeds (*kala dana*), which are a safe cathartic, and form a good substitute for jalap in doses of from 30 to 50 grs. (powdered seeds). The officinal preparations are —Extract of seeds given in from 5 to 10 grs. doses in the form of pills; tincture of *kala dana*, 2 to 3 drachms, compound powder of *kala dana* in from 50 to 60 grs.; and resin of *kala dana* in from 5 to 8 grs doses.

I. turpethum, Dalz. & Gibs. Bby. Fl. 165. *Nisottar, dhudkulmi, teuri.*

A tall twiner, old stems 4-angled, angles bordered by longitudinal wings. Leaves broadly cordate-ovate, 2-4 in. long or larger, entire or sinuate-angled. Flowers white, large. Capsule shorter than the calyx, globular.

Common in Bombay, the Konkan and throughout India The root (turbith root of old pharmacologists) is used as a purgative in doses of from ½ to 1 drachm. An extract of the root is also made, which is given on 10-20 grs. doses.

Ricinus communis, Dalz & Gibs. Bby. Fl. Suppl. 78. *Erundee.*

Cultivated throughout India. (*See* Oils.)

Croton tiglium, Boxb. Fl Ind iii. 682. *Jamalgota.*

Found in the Indian Peninsula, and said to grow in the Konkan. The oil is a powerful drastic purgative. Dose from 1 to 2 or 3 drops.

Croton oblongifolius, Dalz. & Gibs. Bby. Fl. 231. *Gansur.*

The oil of the seeds is as powerful as that of *C. tiglium.*

Baliospermum montanum, D. C. Prod. x.—*B. polyandrum,* Dalz. & Gibs. Bby. Fl. 232. Also called *jamalgota.*

Shrubby. Upper leaves lanceolate, lower ones broader, often lobed. Spikes axillary, about the length of the petioles. Flowers yellowish; female ones at the base. Capsul sub-globose, hispid; seeds smooth, marbled

Found on the hills of Karanja. One powdered seed is the dose generally administered to produce cathartic effects.

Jatropha curcas, Dalz. & Gibs. Bby. Fl. Suppl. 77. *Jampal, jepal.*

Medicinal Plants.

Is common every where.

The oil expressed from the seeds is colourless or pale-yellow, and acts as a purgative in 12 to 15 drop doses.

EMETICS.

Brassica campestris var. Napus.—*B. juncea*, Hook. Fl. Ind. i. 156 and 157.

The *mustard* plant cultivated in India. A tea spoonful or more of the powdered seeds mixed with water is given as an emetic in cases of drunkenness, and when it is desired to empty the stomach without causing depression of the system.

Barringtonia acutangula, Dalz. & Gibs. Bby. Fl. 95. *Samundarphal.*

The powdered fruit is given as an emetic; dose ½ to 1 fruit. (*See* Timber Trees.)

Randia dumetorum, Dalz. & Gibs. Bby. Fl. 119.

The fruit well bruised and mixed with water is administered to produce vomiting. The dose is one fruit. (*See* Timber Trees.)

Tylophora asthmathica, Dalz. & Gibs. Bby. Fl. 150. *Anthamul.*

Twining; branches slender. Leaves 2-3 in. long, ovate-roundish, pointed, cordate at the base. Flowers rather large, long-pedicelled, externally pale-greenish with a tinge of purple, internally light purple; divisions of corolla acute.

Common. Officinal part, the dried leaves which have a very disagreeable smell when bruised, and a nauseous taste. Dose as an emetic 25-30 grs. of the powder of the dried leaves conjoined with ½ gr. or a grain of tartar emetic. The powdered leaves are also given in catarrh, dysentery, fevers and in cases where ipecacuanha is generally employed. The root of this plant, found in the bázárs in the form of thick contorted pieces of a pale colour and a bitterish nauseous taste, has also emetic and diaphoretic properties, and is given in dysentery, etc. The natives bray on a stone 3-4 in. of the root, and administer the paste with a little water.

Asclepias curassavica, Dalz. & Gibs. Bby. Fl. Suppl. 54.

An herbaceous, erect-growing plant cultivated in every garden. Leaves linear lanceolate, resembling those of *Nerium oleander*. Flowers of a reddish-orange colour in terminal umbels.

The root dried and reduced to powder is administered in the West Indies as an emetic in doses of from 20 to 40 grs.: hence the name *bastard* or *wild ipecacuanha*.

Crinum Asiaticum, Dalz. & Gibs. Bby. Fl. 275. *Nagdaun.*

Stemles. Leaves lanceolate, 3-4 ft. long, 5-7 in. broad. Scapes axillary, shorter than the leaves, a little compressed. Flowers 12-50 in an umbel, white, said to be fragrant at nights. Berries the size of a pegeon's head.

Common in the Konkan and cultivated in gardens. Officinal part, the fresh root. Preparations:—Juice of crinum, dose from 2 to 4 fl. drachms; syrup of crinum, dose about 2 fl. drachms.

Boerhaavia diffusa, Dalz. & Gibs. Bby. Fl. 213.—*Punárnav* and *Dæmia extensa*, Dalz. & Gibs. Bby. Fl. 150. *Uttaran* or *utarani*. Are used as emetics. Medicinal Plants.

ANTHELMINTICS.

Melia azadirachta, Dalz. & Gibs. Bby. Fl. 36.

The root bark of this tree is administered as an anthelmintic in the form of decoction (4 ozs. of fresh root bark, water 2 pints, boiled down to a pint). The dose for a child is a table spoonful repeated every third hour, until the bowels or stomach are sensibly affected. Some doctors prefer giving a dose twice a day for several successive days, and then administering an active purgative. In larger doses it is said to produce narcotic symptoms.

Mucuna pruriens, Dalz. & Gibs. Bby. Fl. 70. Cowhage, cowitch.

An annual; branches hairy. Leaflets ovate, silvery beneath, ½-¾ ft. long. Racemes drooping, ½-1 ft. long; flowers purplish. Pod 2-3 in. long, 5-6-seeded, shaped like the letter S, turgid, clothed with tawny stinging hairs.

Common everywhere in hedges. The hairs are administered for the expulsion of round worms in the form of an electuary made with honey. A tea spoonful is given for a dose to a child and a table spoonful to an adult for 3 or 4 successive mornings, followed by a purgative. Applied to the skin, the hairs produce intolerable itching.

Butea frondosa, Dalz. & Gibs. Bby. Fl. 71.

The seeds of this tree are soaked in water, the testa carefully removed, and the kernel dried and reduced to powder; 20 grs. of this powder are given three times a day for three successive days followed by a dose of castor oil on the fourth. (*See* Timber Trees.)

Mangifera Indica, Dalz. & Gibs. Bby. Fl. 51.

Powdered mango seed is effectually administered in doses of 20 to 30 grs. (*See* Timber Trees.)

Vernonia anthelmintica, Dalz. & Gibs. Bby. Fl. 313. *Kalen jiree.*

A large annual composite. Stem 2-3 ft. high, marked with elevated purple spots. Leaves lanceolate, irregularly serrated. Heads of flowers terminal, purple. Seeds cylindrical, about ⅛ in. long, of a dark-brown colour, marked with about 10 paler longitudinal ridges, and crowned with a circle of short brown scales.

Common in waste places near villages throughout India. The seeds are nauseous and bitter, and are administered, well bruised, for the expulsion of round worms in about 1½ drachm doses made into an electuary with honey. An infusion of the powdered seeds is also given. In some parts of India the powdered seeds made into a paste with lime juice are used to kill pediculi.

Punica granatum, Dalz. & Gibs. Bby. Fl. Suppl. 34.

The root bark is very effectual in expelling tape worm. It is given in the form of decoction, which is made by taking of fresh root bark, bruised, 2 ozs., water 2 pints, boiled down to a pint. The mode of administration

Medicinal Plants.

is, 2 fl. ozs. are given before breakfast, and the same quantity repeated every ½ hour, until 6 doses have been taken; these are followed by an aperient. (*See* Timber Trees.)

Mallotus Philippinensis, Bedd. Fl. Sylv. 282.—*Rottlera tinctoria*, Dalz. & Gibs. Bby. 230.

The powder is given in 2 to 3 drachm doses for the expulsion of tape worm. In these doses it acts on the bowels, causing in some cases considerable nausea and griping. (*See* Timber Trees.)

Aristolochia bracteata, Dalz. & Gibs. Bby. Fl. 224.—*Kiramar.*

Perennial plant trailing on the ground; stem about 12-15 in. long. Leaves kidney-shaped, whitish beneath. Flowers of a beautiful dark purple colour. Peduncles furnished at the base with a kidney-shaped curled bract.

Common all over India and kept in all houses in a dry state, and much appreciated on account of its anthelmintic properties. The whole plant is nauseously bitter. Two leaves bruised with water are given for a dose. The dry leaves are also administered in the form of infusion.

FEBRIFUGES.

Adansonia digitata, Dalz. & Gibs. Bby. Fl. Suppl. 9. (*See* Timber Trees.)

Melia azadirachta, Dalz. & Gibs. Bby. Fl. 36.

Officinal preparations are:—Decoction and tincture of the bark; the former is made by taking 2 ozs. of inner layer of the bark bruised; water 1½ pint, boiled for 15 minutes and strained when hot. Of this, 2 to 3 fl. ozs. are administered every second hour previous to the expected paroxysm. The tincture is made by macerating in a closed vessel 2½ ozs. of the inner layer of *nim* bark in a pint of proof spirit for seven days with occasional agitation. Dose 2-3 fl. drachms. There is a belief among the natives that sleeping under this tree is effective in preventing a paroxysm of fever Whether the tree has the same properties as *Ucalyptus globulus* and destroys the poison of malaria, is a point that requires further examination.

Soymida febrifuga, Dalz. & Gibs. Bby. Fl. 38. *Rohan, rohing.*

It is astringent. tonic and antiperiodic. The powdered bark is used in drachm doses three or four times before the expected paroxysm. (*See* Timber Trees.)

Cedrela toona, Dalz. & Gibs. Bby. Fl. 38. *Tunna, tuni, limb.*

The bark of this tree is a powerful astringent and antiperiodic; the dose of the dry bark, about an ounce daily in the form of infusion. (*See* Timber Trees.)

Cæsalpinia bonducella, Dalz. & Gibs. Bby. Fl. 79. *Sagargotta.*

The seeds are tonic and antiperiodic; dose, 10 to 15 grs. Officinal preparation:—Compound powder made of equal parts of seeds

powdered after being deprived of their shells, and powdered black pepper; dose, 15 to 30 grs.

ASTRINGENTS USEFUL IN CASES OF DIARRHŒA AND DYSENTERY.

Ægle marmelos, Dalz. & Gibs. Bby. Fl. 31.

The pulp of the fruit is very efficacious in arresting chronic diarrhœa and dysentery. Officinal preparations :—Mixture, extract and liquid extract; but the best way of using it is making sherbet of the pulp of the ripe fruit, and taking it once or twice a day.

Adansonia digitata, Dalz. & Gibs. Bby. Fl. Suppl. (*See* Timber Trees.)

Punica granatum, Dalz. & Gibs. Bby. Fl. Suppl. 34.

Decoction of the rind of the fruit (rind bruised 2 ozs. boiled down with a pint of water for 15 minutes in a covered vessel) is given in cases of diarrhœa and chronic dysentery in doses of from 1 to 1½ fl. oz.

Eugenia jambolana, Roxb. Fl. Ind. ii. 484.—*Syzigium jambolanum,* Dalz. & Gibs Bby. Fl. 93.

Its bark has very astringent properties, and is much used in the form of decoction. A syrup prepared from the juice of the ripe fruit is a very pleasant drink, and is administered in chronic diarrhœa with good success.

Mangifera Indica, Dalz. & Gibs. Bby. Fl. 51.

Powdered seed acts as an effectual astringent in cases of diarrhœa in doses of from 20 to 30 grs. (*See* Timber Trees.)

Terminalia chebula, Dalz. & Gibs. Bby. Fl. 91.

Fruit and galls found on the leaves are given in diarrhœa. (*See* Timber Trees.)

Holarrhana antidsysenterica, Dalz. & Gibs. Bby. Fl. 145. *Dawla kura.*

The bark, known as *conessee* bark or *codoga palla,* is used with great success in dysenteric affections in the form of decoction (bark 2 ozs., water 2 pints, boiled down to 1 pint). (*See* Timber Trees.)

Alstonia scholaris, Dalz. & Gibs. Bby. Fl. 145. *Satwin.* (*See* Timber Trees.)

Phyllanthus emblica, Dalz. & Gibs. Bby. Fl. 235. *Amla.* (*See* Timber Trees.)

Butea frondosa (*see* Timber Trees) and *Pterocarpus marsupium.* (*See* Tmiber Trees). The gum (kino) of those trees is astringent.

Acacia catechu, Dalz. & Gibs. Bby. Fl. 86.

The extract of the wood of this tree is a powerful astringent. (*See* Timber Trees.) Baker in Hook. Fl. Ind. describes this tree under *A. suma.*

Medicinal Plants

ALTERATIVES.

Hydrocotyle Asiatica, Dalz. & Gibs. Bby. 105. *Bramee,* Indian penny-wort.

A slender herbaceous plant, trailing on the ground. Leaves round, kidney-shaped. Umbels capitate, 2-3-flowered; flowers greenish-white. Fruit orbicular, reticulated with 4 ribs on each of the flat sides. Grows in moist shady places, near tanks and wells. The dried powdered leaves are used with good results in anæsthetic leprosy, secondary syphilis and other cutaneous diseases, in from 5 to 8 grs doses. Powdered leaves, either fresh or dried, are applied to indolent ulcers. Diuretic properties are also assigned to these leaves.

Eclipta prostrata, Dalz. & Gibs. Bby. Fl. 127. *Maka, bhangrah.*

A common weed belonging to the Order *Compositæ*, to be met with almost everywhere. Stem prostrate or ascending, rough with adpressed hairs. Leaves oblong, lanceolate, slightly serrated, rough. The heads of flowers white. The plant is used in the form of decoction in affections of the liver and spleen, and in dropsy. It is supposed to be a good substitute for taraxacum in hepatic affections. The expressed juice appears to be the best form of administration. The natives use the plant as pot herb.

Hemisdesmus Indicus, Dalz. & Gibs. Bby. Fl. 147. *Anantamul,* Mar.; *magrabu,* Hind.; *mackwy,* Dec.; country sarsaparilla.

Small, twining plant. Leaves cordate, narrow, linear, pointed. Flowers pale-green on the outside, dark-blood-coloured inside. Follicles slender, straight.

Common everywhere. The root is the officinal part, and is esteemed as a valuable alterative tonic, diuretic and diaphoretic, being used in all cases in which sarsaparilla is employed. It is best given in the form of infusion (bruised root 1 oz, boiling water 10 ozs, infused in a covered vessel for an hour). Dose from 2-3 fl ozs, thrice daily.

Calotropis gigantea and **C procera,** Dalz. & Gibs. Bby. Fl. 149.

Both the root and the milk of the stem are used in leprosy and other skin-diseases. (*See* Fibrous Plants.)

Hydnocarpus Wightiana, Dalz. & Gibs. Bby Fl. 11.

The oil is used in leprosy. (*See* Timber Trees.)

Pongamia glabra, Dalz. & Gibs. Bby. Fl. 77.

The oil of the seeds is used in itch and other skin diseases. (*See* Timber Trees.)

Thespesia populnea, Dalz. & Gibs. Bby. Fl. 18. *Bhendi.*

The yellow viscid juice of the capsule is used in scabies, etc. (*See* Timber Trees.)

Schleichera trijuga, Dalz. & Gibs. Bby. Fl. 35. *Kussan, kusim.* Medicinal Plants.

Used in curing itch. (*See* Timber Trees.)

Ficus Bengalensis,* Dalz. & Gibs. Bby. Fl. 240. *War,* **banyan tree,** *wad.*

The milky juice of this tree is applied with benefit to the trouble-some cracks on the soles of the feet to which the natives are so liable.

TONICS.

Almost all the medicines described as "febrifuges" are good and efficient tonics when used in smaller doses. It is believed that they act as antiperiodic by exercising a tonic influence on the stomach and improving the general health. They are not regarded to possess the same power, or act in the same way as quinine. Besides these, we have in India, and especially in the Konkan many other pure bitter tonics. A few will be enumerated here.

Tilnospora cordifolia, Dalz. & Gibs. Bby. Fl. 5. *Gul-vel, gulancha.*

Grows in the Konkan and all over India. A climbing shrub, with scabrous corky bark cordate leaves, small yellow flowers, and a berry the size of a cherry, red when ripe. It is a good tonic, given in cases of debility caused by repeated attacks of intermittent fever and enlargement of the spleen. The parts used are the root and the stem collected during hot season, when the bitter principle is most abundant.

Officinal preparations:—

Tincture of gulancha, dose 1 to 2 drachms, thrice daily.

Extract of gulancha dose 10 to 30 grs., thrice daily

This corresponds to an impure extract prepared by the natives of Southern Marátha Country, and called *palo,* being used in doses of from 1 to 2 drachms.

Infusion of Gulancha.—(Gulancha cut small 1 oz., cold water 10 ozs; macerate in a covered vessel for two hours, and strain). Dose from 1 to 3 ozs., thrice daily.

Ophelia chirata. *Chiretta.*

This is a well-known plant, native of temperate Himalayas, whence it is brought to the plains; it is a pure tonic, extensively used in hospital and private practice.

Officinal preparations :—

Tincture of Chiretta.—Dose 1 to 2 drachms, thrice daily.

Infusion of Chiretta.—(A quarter of an ounce infused in 10 ozs. of hot water in a covered vessel for half an hour). Dose 1 to 2 ozs., thrice daily

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*The genera *Urostigma* and *Covellia* are united with *Ficus.*

Medicinal Plants

There are people who take a dose of this infusion every morning all the year round, in the belief that it prevents attacks of intermittent fever.

Ophelia multiflora, Dalz. & Gibs. Bby. Fl 156. Also called *chiretta, kariwi*

A small, herbaceous plant with quadrangular stem and white flowers; grows at Mahábaleshvar. The dried stems and roots, sold in the bázár, occur in pieces, about 2 inches long, of the thickness of a quill. It is an excellent substitute for officinal *chiretta*, and equal to it in effect.

Exacuum bicolor, Dalz. & Gibs. Bby. Fl. 156.

Pretty common in pasture grounds of the Konkan during the rains. It is worthy of a place in our gardens on account of its beautiful flowers. The Pharmacopœia of India says that its dried stalks are sold in Southern India under the name of *country kariyat*. It possesses the same tonic and stomachic properties of gentian, and may, where procurable, be substituted for it.

Erithræa Roxburghii, Dalz. & Gibs. Bby. Fl. 157. *Kuroo nai* or *kadavi nai*

Another small, herbaceous plant with beautiful pink, star-like flowers, common in cultivated grounds after the rains. The whole plant is bitter like the other gentians, and is esteemed by the natives as a valuable tonic.

Eucostema (Hippion) orientalis, Dalz. & Gibs. Bby. Fl. 157

Another gentian common in Gujarát, though rare in the Konkan. Stem four-sided, leafy from the base, small white flowers. The bitterness of this plant is not so intense as that of chiretta, and approaches more nearly that of gentian. The natives of Gujarát eat the herb pickled. It is said that it is much used by the natives of Madras as a stomachic, as, in addition to its tonic properties, it is also somewhat laxative.

Andrographis paniculata, Dalz. & Gibs. Bby. Fl. 198. *Kiraita, kirat, kiraittem, kariyat.*

This is a small herbaceous plant blonging to the order *Acanthaceæ* with quadrangular stem and beautiful white flowers. Officinal preparations are infusion and tincture. It is a bitter tonic and stomachic, analogous in action to quassia. It is much used in Southern Maratha countries and Southern Konkan (where it is confounded with officinal chiretta) in cases of general debility, especially of the stomach, during convalescence from fevers, in advanced stages of dysentery, etc.

Acorus Calamus, Dalz. & Gibs. Bby. Fl. Suppl. 96. *Vekhand*, sweet flag of the English.

A common plant in moist places of India, Europe and America. The rhizome (root-stalk) has an aromatic bitter taste, and has been held in high esteem from the earliest ages as a good stomachic tonic.

Medicinal Plants.

Its virtues reside in a volatile oil. The dried rhizome sold in the bazar is of the thickness of the thumb, of various lengths, and covered with sheath-like scales. It is administered in cases of debility of the stomach, or dyspepsia attended with flatulence. Rubbed with spirits of cashew or any other spirit it is used as an efficient external application in sprains and chronic rheumatism. It is often rubbed for this purpose with equal parts of common extract of aloes. Internally it is best given in infusion (dried rhizomes, bruised, 1 oz.; boiling water 10 ozs.) in doses of 1½ to 2 ozs. The natives administer it also in the form of powder in doses of from 20 to 40 grs. or more.

There are many oils minutely described elsewhere which are used medicinally. (*See* Chapter on Oils)

VEGETABLE POISONS.

MENISPERMACEÆ.

Anamirta cocculus, Dalz. & Gibs. Bby. Fl. 4. *Kakmari.*

The seeds possess powerfully poisonous properties due to the presence of *picrotoxin;* 6 to 10 grains of them are stated to be sufficient to kill a dog. The symptoms produced are nausea, vomiting, tetanic convulsions, and finally insensibility. The chief use of the seeds is to poison fish, for which purpose they are mixed with rice and thrown into tanks and the stagnant water of rivers; the fish become stupefied, float on the water, and are thus easily taken. Though fish thus caught is thought to be poisonous, the natives eat it after repeatedly washing and cooking it. These seeds are officinal in the Pharmacopœia of India, and enter as an ingredient in the preparation of an ointment used for the destruction of pediculi.

CELASTRINEÆ.

Elœdendron Roxburghii, Dalz. & Gibs. Bby. Fl. 48. *Tamruj.*

The bark is said to be a virulent poison.—Brand.

ANACARDIACEÆ.

Semecarpus anacardium, Dalz. & Gibs. Bby. Fl. 52. *Biba;* marking nut.

The kernel of the seeds is eaten, but the pericarp is full of acrid juice which is collected and used for marking cloth. This juice is a powerful vesicant, and is also extensively used by the natives in the treatment of rheumatism, liver and other painful affections. It must, however, be employed with caution, as in certain constitutions it is apt to produce erysipelatous inflammation of the whole body, followed sometimes by death. It also causes deep ulceration and sloughing which has at times resulted fatally. Criminally it is applied to the os uteri to produce abortion.

The juice of the tree is so poisonous and acrid that people are afraid of cutting it, and they only do so after killing it by removing the bark. It is said that disagreeable consequences often result by even sleeping under the tree.

LEGUMINOSÆ.

Lathyrus sativus, Dalz. & Gibs. Bby. Fl. Suppl. 22. *Lang.* (*See* Vegetables and Fruits, etc.)

Vegetable Poisons.

LYTHRACEÆ.

Ammania baccifera, Dalz. & Gibs. Bby. Fl. 97. *Daudmare* (Bong.), *jalmukhi*,

A small herb, 6 in. 2-ft. high, very common in cultivated ground during the rains. The leaves are very acrid, and are used by the natives to raise blisters, and as a counterirritant in rheumatic inflammations. The fresh leaves bruised and applied to the skin produce a blister within half an hour. It appears that the juice of the leaves mixed with cooked food has been often used as a poison; it produces extreme tormina and acute suffering, with burning pain in the abdomen.

SAMYDACEÆ.

Casearia graveolens, Dalz & Gibs. Bby. Fl 11 *Moda* (Mar.)

It is stated elsewhere that the fruit is used for killing fish. It is also believed that it acts as a poison upon men. An infusion of the leaves of *C. ulmifera,* named in Brazil "marmeloiro do matto", is given internally and also applied externally as a valuable remedy against the bites of serpents.

CUCURBITACEÆ.

Melothria Madraspatana, Cogn in D. C. Prod Cont.—*Muckia scabrella,* Dalz & Gibs. Bby. Fl. 100. *Ghugri.*

This cucurbit common in every hedge is hispid and scabrous all over; stem angular and berry globular, scarlet when ripe, size of a pea; seeds rugose.

The seeds are stated to be poisonous.

Lagenaria vulgaris, Dalz. & Gibs. Bby. Fl. Suppl. 36 *Tumbe, harrea kaddu*, bottle-gourd

The whole plant is of a musky scent, soft, downy Leaves cordate, glaucous, with 2 glands at the base Fruit smooth, bottle-shaped, yellow when ripe. In the wild state the fruit is poisonous, producing symptoms like those of cholera. Dr. Lindley says that some sailors were poisoned and died at one of the ports of England from drinking beer which was kept in a flask made of one of these gourds, and Dr. Royle states that he learnt from a respectable and intelligent native doctor attached to the jail hospital at Sharanpore that he had seen a case of poisoning from eating of the bitter pulp, in which the symptoms were those of cholera. The natives of the Deccan take advantage of the tough rind of the fruit for variety of purposes, and use the fruits as floats for crossing rivers. Four or five fruits are enough to support a man with a burden on his head.

COMPANULACEÆ.

Lobelia nicotianæfolia, Dalz. & Gibs. Bby. Fl. 133 *Dawal bakenal.*

Vegetable Poisons.

This is an elegant tall shrub with hollow stems, long sessile leaves and large white flowers. Common on our ghâts. The seeds are said to be extremely acrid, and like those of the other species to contain an acro-narcotic poison, so much so that they are said to be preferred to datura when rapid effect is desired.

PLUMBAGINEÆ.

Plumbago rosea, Linn.—*P. coccinea*, Dalz. & Gibs. Bby. Fl. Suppl. 71. *Lal-chitra.*

A common shrub in the Southern Konkan and throughout India. The pounded root acts as a powerful vesicant, and a paste made from it is employed in rheumatism and other painful swellings of the joints, etc. It is also criminally employed to produce abortion, the scraped root-bark being introduced for this purpose into the os uteri. This is apt to result in inflammation of the uterus and the peritoneal cavity, and death. The action of the external application is often assisted by its internal administration. There are cases on record in which it has been used internally alone with criminal intention, and has resulted in death.

P. Zeylanica, Dalz. & Gibs. Bby. Fl. 220. *Chitrack, chitra.*

Common in Gujarát and the Konkan.

It is a shrubby plant, cultivated in gardens on account of its white flowers. The bark of its root is also poisonous and acrid.

APOCYNACEÆ.

Nerium odorum, Dalz. & Gibs. Bby. Fl. Suppl. 52. Oleander; *kaner, ganira, kararera.*

A large shrub indigenous to North-West and Central India, Sind and Afghánistan. Cultivated in gardens for the sake of its sweet-scented, rose-coloured, white or red flowers. All parts of this plant are more or less poisonous, the bark of the root being especially so. The bark is prescribed in leprosy and other cutaneous diseases by native doctors, but has also been used for criminal and suicidal purposes. Usually it acts by directly depressing the nervous system. A case has, however, been recorded in which well-marked tetanic symptoms followed its exhibition. The red flowers are a choice offering to Ganpatti. In some parts of the Mediterranean the root is employed to kill rats.

Thevetia neriifolia, D. C. Prod. viii. 344.—*Cerbera Thevetia*, Dalz. & Gibs. Bby. Fl. Suppl. 53. The exile or yellow oleander; *pivala kaner.*

A large shrub or a small tree, native of America and West Indies, and naturalized all over India. Leaves resembling those of the last species, bell-shaped, yellow flowers and fruit of the size of a crab apple. The bark of this plant, which is possessed of considerable antiperiodic properties, is employed in the treatment of intermittent fevers. In large doses it acts as an acro-narcotic poison by inducing purging and vomiting. Caution is, therefore

much needed in using it; for cases have been recorded in which the use of the kernels of the drupe produced symptoms of poisoning. Vegetable Poisons.

Cerbera odollam, Dalz & Gibs. Bby. Fl. Suppl. 53.

It is common along the swamps in Southern Konkan and the coast of Madras, Bengal, Australia, Indian Archipelago, etc. Cultivated on account of its beautiful shining leaves and white sweet-scented flowers. The milky juice and leaves are stated to be possessed of purgative properties; but their use is to be deprecated, as there are reasons for believing that even in moderate quantities this tree, and specially its drupe, are possessed of poisonous properties.

Ophioxylon (Rauwolfia) serpentinum, Dalz & Gibs. Bby. Fl. 143. *Chandra, chandrika, chotachand, harani.*

This shrub is common in the Konkan, Goa, forests of Madras, Burma, etc. It is stated in the Bombay Flora that it is used to poison tigers. (*See* Antidotes to Snake-bites.)

LOGANIACEÆ

Strychnos nux-vomica, Dalz & Gibs Bby. Fl 155 *Kajra.*

Very common in the Konkan The seeds contain *strychnia*, an extremely bitter and poisonous alkaloid, mixed with another poisonous alalkoid *brucia*. These substances are also found in the bark and root of this and other species of the genus, and it is remarkable that parasitic plants of the order *Loranthaceæ*, which grow on the trunk of *S. nux-vomica,* acquire the poisonous properties of the latter, and contain the same alkaloids. Sir W. O'Shaugnessy states that he saw an athletic European sailor killed in less than an hour by half a drachm of the powdered leaves (of one of these parasites) taken by mistake for cubebs. It appears, however, that the yellow juicy pulp between the nuts is not poisonous, for birds devour it voraciously, and Dr. Birdwood (Veg. Prod. of Bom Pr) says the same of the pulp enclosing its deadly seeds, in fact, he includes the fruit of *kajra* in his class of edible fruits. The seeds are swallowed by birds with impunity, being too hard to digest.

Strychnos colubrina, Dalz. & Gibs Bby. Fl 115 *Nagmussad* of Telingu.

The wood and root of this climbing shrub, which grows in the Konkans, contain strychnia The fruit is also said to be poisonous This is the true "*Páo de cobra de capello*" of the Portuguese, highly esteemed by the natives as an infallible remedy for the bite of the cobra and other venomous reptiles For this purpose it is brayed in rice water, and given in small doses internally, and also applied externally.

ASCLEPIADACEÆ.

Tylophora fasciculata, Dalz. & Gibs. Bby. Fl. 151.

In one case, brought to my notice, the root of this plant is said to have caused poisoning This requires confirmation.

Vegetable Poisons.

SOLANACEÆ.

Datura alba, Dalz. & Gibs. Bby. Fl. 174.

This is a well-known shrub. Every part is poisonous, but the part generally used, is the seed which after being pounded is mixed with food and used by thieves in order to deprive their victims of the power of resistance. This poison causes a sort of temporary insanity, during which the sufferer does not know what passes before his eyes.

Withania (Physalis) somnifera, Dalz & Gibs. Bby. Fl. 175. *Asgund.*

A common herb, 2-3 ft. high, met with in Bombay and other parts of India. It is stated in the Bombay Flora that "the root and leaves are powerfully narcotic and diuretic, the seeds are employed to coagulate milk like the *Puneera* (in Sind), a plant of the same family.

THYMELACEÆ.

Lasiosiphon eriocephalus, L. speciosus, Dalz. & Gibs. Bby. Fl. 221. *Rametta.*

Common at Mátherán, Karli, Khandála and other gháts. The leaves are said to be acrid and poisonous, and to affect men as well as fish. The trees are often met with stripped of their bark, which is used in poisoning fish. It is a fact that an acrid poisonous principle abounds in most of the species of this order, and which possess very valuable medicinal properties, though not devoid of dangerous effects

EUPHORBIACEÆ

The greater number of species of this order are violent poisons owing to the presence of an acrid principle existing in almost all the organs, especially in the milky juice. There are several plants in India which are very formidable and deleterious, such as :

Euphorbia tirucalli, Dalz. & Gibs Bby. Fl. Suppl. 76. Milk-bush, *niwal,* Goa, *tiru kally,* Malay.

The juice of this well-known and commonly cultivated (for hedges) *euphorbia* is extremely acrid and vesicant. (*See* plants used for poisoning fish.)

Exæcaria insignis, D. C Prod. xv. p. ii. 1213.

Falconera Malabarica, Dalz. & Gibs. Bby. Fl. 227. *Honi,* Bomb., *dudla,* Guz ; *hor* or *stiora,* Goa.

Fruit and juice very acrid and poisonous.

Mallotus Philippinensis, Bedd. Fl. Sylv. t. 282.—*Rottlera tinctoria,* Dalz & Gibs. Bby. Fl. 230.

The powder *(kamela)* is administered for the expulsion of intestinal worms, but acts as an irritant poison if given in large doses (see medicinal and fish-killing-plants). (*See* Timber Trees.)

Vegetable Poisons.

Baliospermum montanum, D. C. Prod. xv. p. ii. 1125.—*B. polyandrum*, Dalz. & Gibs Bby. Fl. 232. *Jamalgota.*

The seeds are very acrid, and have very strong drastic purgative properties. One seed pounded and mixed with some bland oil is the dose usually administered. In larger quantities they produce violent symptoms.

Chrosophora plicata, Dalz. & Gibs Bby. Fl 232

A common herb in Bombay and elsewhere. The whole plant is acrid, and possesses drastic properties The powdered seeds, mixed with large quantities of some bland oil, is given as a cathartic.

Securinega obovata, D.C Prod xv. p ii. 449 —*Fluggea virosa,* Dalz. & Gibs. Bby. Fl. 236 *Kandori.*

It has been stated elsewhere that the bark of this large shrub, common in Bombay, is employed in some parts of India to intoxicate fish. This bark is said also to affect men injuriously. (*See* Timber Trees)

Croton tiglium, Roxb Fl Ind iii Purging croton; *jamalgota, jepal.*

Rare in Southern Konkan. Common in Travancore and other parts of Madras, Bengal, Burma, Ceylon and Indian Archipelago. The seeds and their oil are well known as powerful cathartics cases have, however, been recorded where their use in larger quantities, either criminally or unintentionally, have produced death from excessive purging. The oil applied externally produces a vesicular eruption ; it is, therefore, sometimes prescribed in the form of liniment in rheumatism, paralytic affections, diseases of the joints, chest, etc.

Jatropha curcas, Dalz & Gibs. Bby. Fl. Suppl. 77. *Jempal or jepal, arbi errand.*

Native of Brazil, introduced by the Portuguese, and now common all over India. The expressed oil from the nuts is used in small quantities as a substitute for castor oil, but is very uncertain in its action. In over-doses its action is that of an acro-narcotic poison. A case is recorded in which the partaking of twenty nuts produced very violent purging and vomiting and other symptoms of poisoning. It yielded, however, to careful treatment. Lime-juice is the best remedy.

Jatropha multifida, D. C. Prod. xvii. 1089. French physic-nuts, coral plant.

Indigenous in America and Africa and cultivated in gardens. The seeds are even more powerfully purgative than those of the preceding, and a case has been recorded where only three of them being taken, violent vomiting and purging, intense pain and heat in the stomach, with great prostration followed, though the patient eventually recovered under treatment.

Vegetable Poisons.

Jatropha manihot, Dalz. & Gibs. Bby. Fl. Suppl. 77. *Tapioca, mandioca* and *cassava* plant. (*See* Chapter on Vegetables and Fruits)

Hura crepitans, Dalz. & Gibs. Bby. Fl Suppl. 76. Sand-box tree.

A small tree with a few prickles on the trunk, native of South America and cultivated in gardens Flowers red in pyramidal aments. Fruit round, smooth, size of a small orange, when ripe bursting into several valves with noise: hence the name. The juice of the bark and leaves is acrid and corrosive, produces blindness in a few days if touched to the eyes. The seeds are possessed of violent cathartic properties, and there are on record cases in which one or two seeds administered in the form of an emulsion nearly proved fatal.

AMARYLLIDEÆ.

Crinum Asiaticum, Dalz & Gibs. Bby. Fl. 275. *Nagdown.*

The root is officinal in the Pharmacopœia of India, where it is recommended as a safe emetic. It has a peculiar narcotic smell. The plant was named by Rumphuis and others *C. toxicarium* on account of its virtues " in curing the disease caused by the poisoned arrows of the Macassars in their wars," and not because of its toxic effects. I must state here, however, for future observation what was narrated to me by a friend acquainted with botany, *viz.*, that a whole family had suffered from symptoms like those of cholera (vomiting and purging) from having accidentally eaten the powder of *nagdown.*

MELANTHACEÆ.

Methonia (gloriosa) superba, Dalz. & Gibs. Bby. Fl. 250, *Khanna-nag, kala buch-nag.*

The root of this climbing herbaceous plant, common everywhere and cultivated in gardens, is said by Gibson and Dalzell and others to be poisonous Experiments made at the Calcutta Medical College have shown that the root is a very powerful poison.

AROIDEÆ.

Lagenandra toxicaria, Dalz. & Gibs. Bby. Fl. 257. *Watsanab.*

This aroid is common in the marshes of Belgaum and South Konkan.

See Famine Plants for the account of other poisonous aroids.

GRAMINEÆ.

Paspalum scrobiculatum, Dalz. & Gibs. Bby. Fl. Suppl. 97. *Kodra*

Vegetable Poisons.

It is said that this grain occasionally produces violent symptoms of poisoning, purging, vomiting, and narcotism; perhaps it is the ergotised grain that is the cause of these. Gibson and Dalzell say that this is "a very common and cheap grain, but not wholesome; grown on the hill lands of the Konkan, especially the variety *Hareek*, which often induces temporary insanity and spasms, etc. Large numbers of people may be occasionally seen thus affected." (*See* Chapter on Vegetables and Fruits.)

PLANTS USED FOR POISONING FISH.

Anamirta cocculus, Dalz. & Gibs. Bby Fl 4. *Kakamari.*

It is the *Cocculus Indicus* of commerce. A twining shrub with thick corky bark. Leaves cordate, 4 8 in long, pendulous panicles of greenish flowers and smooth black drupes. Common in the Konkan The seeds are used in poisoning fish and game in India, and in Europe to adulterate beer.

Hydnocarpus Wightiana The fruit. (*See* Timber Trees.)

Walsura piscidia, Dalz. & Gibs. Bby. Fl 37. The bark. (*See* Timber Trees)

Sapinolus trifoliatus Fruit and soapy water. (*See* Timber Trees)

Mundulea suberosa, Hook F. L Ind. ii. 110.—*Tephrosia suberosa*, Dalz & Gibs. Bby Fl 60. *Surti*

A small tree with pinnate leaves. Racemes of rose-coloured flowers and long silky legumes, contracted between the seeds. Northern Konkan The seeds are used for poisoning fish.

Ougeinia Dalbergioides, Bed. F. L. Sylv. t. 36.—*Dalbergia oogeinensis*, Dalz & Gibs Bby Fl 78. Pounded bark. (*See* Timber Trees)

Albizzia procera, Dalz. & Gibs Bby. Fl. 87.

The bark pounded and thrown into water stupefies fish.

Barringtonia acutangula, Dalz & Gibs Bby. Fl 95 Pounded bark. (*See* Timber Trees)

Casearia tomentosa. Acrid juice of the fruit. (*See* Timber Trees)

Casearia graveolens. Fruit. (*See* Timber Trees.)

Randia dumetornm. Pounded bark. (*See* Timber Trees.)

Bassia latifolia Oil cake. (*See* Timber Trees.)

Mæsa Indica, Dalz. & Gibs. Bby. Fl. 736. *Atki.*

A shrub. Leaves oblong pointed, dentate with large distant teeth, 3-6 in long. Flowers small, pure white. Berry globose, white, size of a pea Common along the ghâts. In Kánara the leaves are used to poison fish.

Securinega obovata *(Fluggea virosa)*

Plants used for poisoning fish.

The bark and the juice are fatal to maggots in sores. (*See* Timber Trees.)

Euphorbia tirucalli. The acrid juice of the tender leaves. (See Timber Trees and Poisons.)

Excæcaria Indica, Fl. Beng.

A plant of Ceylon, Bengal and Burma. The seeds are used to intoxicate fish.

MYRSINEÆ.

Gnetum scandens, Dalz. & Gibs. Bby. Fl. 246. *Kumbal, umbli.*

An extensive scandent shrub, common in the ravines of Mahábaleshvar and forests of Khandála and Konkan. Leaves are said to be used to poison fish in the Konkan.

VEGETABLE ANTIDOTES TO SNAKE-BITES, etc.

NUMEROUS plants are held in great esteem by natives as valuable in the cure of snake-bites; but the subject of snake-poisoning is surrounded by so many elements of doubt that it is not safe to believe in the efficacy of remedies indicated on the testimony of ignorant people.

Limonia acidissima, Dalz. & Gibs. Bby. Fl. 29.

An armed shrub, belonging to the orange family, with pinnate leaves, white fragrant flowers and globose fruit. Found in Southern Konkan. The pulp of the fruit, which is of a reddish colour, is used as an antidote against snake-bites.

Glycosmis pentaphylla, Dalz. & Gibs. Bby. 29. *Kirmira; menki*, Goa; belongs to the same family.

An erect, unarmed shrub. Leaflets 3-5. Flowers small, white. Fruit size of a pea, whitish. Common in Southern Konkan. The wood bruised with simple or pure water is often given.

Elæodendron glaucum, Roxb. Fl. Ind i. 638.—*E. Roxburghia*, Dalz. & Gibs. Bby. Fl. 48. *Tamruj*.

The root bark of this plant, which grows chiefly in Sátára and other parts of the Deccan, is in high repute as an antidote against snake-bites. The stem bark is said to be a virulent poison.

Alangium Lamarckii. (*See* Timber Trees.)

Notonia grandiflora, Dalz. & Gibs. Bby. Fl. 132. *Wander-rotti.*

This plant is common in gardens and on the gháts. An infusion of the bruised stem in cold water is given as a preventive against hydrophobia.

Ophioxylon (Rauwoolfia) serpentinum, Dalz. & Gibs. Bby. Fl. 143. *Chandra, chota chand.*

An elegant shrub common in the Konkan, Goa, in the forests of Madras, Burma and other parts of India. The root is held in very high esteem as an antidote against snake-bites. It is bitter, and is administered in the form of decoction as a febrifuge, anthelmintic, and to promote uterine contractions in cases of tedious labours.

Wrightia tomentosa.

The bark of the stem and root are used by natives in snake-bites and stings of scorpions. (*See* Timber Trees.)

Dœmia extensa, Dalz. & Gibs. Bby. Fl. 150. *Sagowani*; Hind. *utrcn*; Dec. *utarni*.

A perennial twining plant belonging to the order *Asclepiadeæ*. Flowers dull-white, on long peduncles, follicles covered with soft bristles. Common in Bombay, Poona, etc. The root is applied as a remedy in snake-bites. It is also employed extensively as an expectorant in the treatment of catarrhal affections in 10-gr. doses.

Vegetable Antidotes to Snake-bites.

Gymnema sylvestre, Dalz. & Gibs. Bby. Fl. 151. *Kaoli.*

Also an *asclepiad;* found in Bombay and in the Southern Marátha Country. A large twining plant, with small, elegant, light-yellow flowers, which appear in the rains. The natives hold the root in esteem as a local and internal remedy in snake-bites.

Strychnos colubrina, Dalz. & Gibs. Bby. Fl. 155. *Naga-massad* of Telingu.

The wood and root of this climbing shrub, which grows in the Konkans, contains *strychnia*. The fruit is also said to be poisonous. This is the true "*Páo de cobra de capello*" of the Portuguese, highly esteemed by the natives as an infallible remedy for the bite of the cobra and other venomous reptiles. For this purpose it is brayed in rice-water, and given in small doses internally and also applied externally.

Achyranthes aspera, Dalz. & Gibs. Bby. Fl. 218. *Agarah* (Mar.)

A common weed belonging to the *Amaranthaceæ;* appears during the rains. Flowers greenish, shining, in rough panicles. These are used in infusions as external applications in snake-bites.

Aristolochia Indica, Dalz. & Gibs. Bby. Fl. 224. *Sapsan.*

A small, shrubby, twining plant. Leaves wedge-form. Flowers purple-coloured. Capsule oblong, pendulous.

Hills throughout the Konkans. The root of this plant, which is bitter, is held in high esteem as a specific in cases of snake-bites by the natives. It was known to the early Portuguese settlers, who called it *raiz de cobra*. The expressed juice of the leaves is also used for the same purpose. The root is used in fevers.

Bragantia Wallichii, Dalz. & Gibs. Bby. Fl. 225. *Alpam,* Mal.

A small shrubby plant found in Bombay, Southern Konkan, Goa and Malabár, belonging to the order *Aristolochia*. The juice of the leaves is considered as an antidote in snake-bites, especially in that of the cobra.

Euphorbia neriifolia, Dalz. & Gibs. Bby. 226. *Thor,* Bomb.; *nivul-kanta,* Goa; common milk-bush.

Shrubby, often arboreous. Branches 5-angled; stipulary spines paired. Leaves oblong, about 3 in long, fleshy. Common. The root enjoys an almost universal repute as an antidote in snake-bites, and is administered mixed with black pepper.

Mallotus Philippinensis.

The fruit and leaves rubbed with honey are applied to the bites of poisonous animals. (*See* Timber Trees and Medicinal Plants.)

FODDER.

NUMEROUS grasses, cultivated or indigenous, afford abundance of excellent green fodder. The several panicums, digitarias, coix and andropogons, etc, are considered more or less nourishing.

Cynodon dactylon, Dalz. & Gibs. Bby. Fl. 297. *Harryali* or *durva* is much valued all over India, being used both green and made into hay; but

Anthistiria polystachia and **A. cymbaria**, Dalz. & Gibs. Bby. Fl. 304, known in Bombay as *ful gans* or *gurat* and in the Southern Marátha Country and Goa as *korrud*, form the greatest part of the hay used in Bombay.

The natives feed their cattle on the sweet stalks and leaves of

Spicillaria spicata, Dalz. & Gibs. Bby. Fl. Suppl. 99. *Bájri.*

Sorghum vulgare, Dalz. & Gibs. Bby. Fl. 99. *Jowári.*

The stalk, called *karbi*, is much used, specially in the Deccan.

Adropogon (Holcus) cernuus, Dalz. & Gibs. Bby. Fl. Suppl. 99. *Shallu.*

This is also much valued, and said to be very nutritious.

A. glaber. *Tambut.*

A. scandens. *Marwail.*

Panicum (oplismenus) frumentaceum, Dalz. & Gibs. Bby. Fl. Suppl. 98. *Shamoola.*

P. Italicum, Dalz. & Gibs. Bby. Fl. Suppl. 98. *Kangni, kora, kang.*

P. miliaceum, Dalz. & Gibs. Bby. Fl. Suppl. 98. *Wurri, sava.*

P. pilosum, Dalz. & Gibs. Bby. Fl. Suppl. 98. *Badlee.*

All these panicums and bájri and jowári are cultivated for the grain, which forms the food of the people in various districts of this Presidency.

P. (oplismenus) colonum, Dalz. & Gibs. Bby. Fl. 291. *Borrun.*

P. (setaria) glaucum, Dalz. & Gibs. Bby. Fl. 293. *Kolara.*

Paspalum scrobiculatum, Dalz. & Gibs. Bby. Fl. Suppl. 97. *Kodroa-kora.*

(*See* Vegetables and Fruits). It produces poisonous symptoms in the cattle, etc.

Imperata (saccharum) spontanea, called *kan* in Sind. Fodder.

Chloris barbata, Dalz. & Gibs. Bby. Fl. 296. Very common.

Saccharam officinarum, Dalz. & Gibs. Bby. Fl. Suppl. 99. *Use, sirdi;* sugarcane.

The leaves used as fodder and reckoned by some as superior to all kinds of food for cattle.

Bambusa arundinacea (*See* Timber Trees.)

Dendrocalamus strictus (*see* Timber Trees) and other bambus. Tender leaves eaten by cattle.

Medicago sativa, Dalz. & Gibs. Bby. Fl. Suppl. 21.

Cultivated as food for horses only. People who can afford it, give their cattle a daily ration of cakes of the various seeds already described in the chapter on oil-yielding plants and also the following pulses :—

Phaseolus aconitafolius, Roxb. Fl. Ind. iii. 299; Dalz. & Gibs. Bby. Fl. Suppl. 23. *Mhat.*

Phaseolus trilobus, Dalz. & Gibs. Bby. Fl. 71. *Arkmat.* Common.

P. mungo, Dalz. & Gibs. Bby. Fl. Suppl. 23. *Múng.*

P. mal (botanically a variety of the last). *Urid.*

Cyamopsis psaralloides, Dalz. & Gibs. Bby. Fl. Suppl. 21. *Gowar.*

Dolichos biflorus and uniflorus, Dalz. & Gibs. Bby. Fl. Suppl. 23. *Kulti.*

Cicer arietinum, Dalz. & Gibs. Bby. Fl. Suppl. 22. *Channa.*

Almost all these are dhal-producing plants used for feeding cattle and horses, and some for human food. The tender stalks and leaves of these and of several other leguminous plants are considered excellent fodder, especially for milch cattle. In fact, natives mix, whenever possible, straw with green grass or leaves of some of the plants mentioned below to whet the appetite and increase the nutritive properties of fodder.

Saccopetalum tomentosum. Leaves.

Caparis spinosa, C. Murraya, Dalz. & Gibs. Bby. Fl. 9. The leaves and ripe fruits are greedily eaten by goats and sheep.

C. horrida, Dalz. & Gibs. Bby. Fl. 10. Twigs, shoots and leaves eaten by elephants and goats.

Flacourtia cataphracta. Leaves.*

Flacourtia Ramontchii Leaves and twigs.

Grewia tiliafolia. Leaves and twigs.

Ægle marmelos. Leaves and twigs.

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* See Timber Trees for the description of this and the following plants.

Fodder.

Garuga pinnata. Shoots and leaves.
Cedrela toona. In some parts, young shoots and leaves.
Zizyphus jujuba. The leaves are much valued.
„ **rugosa.** Leaves. (*See* Fruits.)
„ **xylopyra.** Young shoots, leaves and fruits.
Schleichera trijuga. Twigs and leaves.
Odina Wodier. Leaves and young branches.
Moringa pterygosperma. Leaves and twigs.
Alhagi maurorum. *Ut-katara* and *javus* Leaves.
Parkinsonia aculeata Young branches and leaves for goats.
Butea frondosa. Leaves are given to buffaloes.
Ougenia Dalbergioides Leaves and twigs for cattle.
Dalbergia latifolia. Leaves and twigs serve as cattle fodder in Oude
Prosopis spicigera. Pods for camels, cattle, and goats.
Albizzia odoratissima. Twigs and leaves
„ **stipulata.** Twigs and leaves.
Stephegyne parviflora. Leaves.
Anthocephalus cadamba „
Hymenodictyon excelsum „
Randia dumetorum „
Ehretia lævis „
Briedelia retusa „
Briedelia montana „
Putranjiva Roxburghii „
Ulmus integrifolia *Warlanj* „
Ficus Bengalensis. Several other species of this genus.
Salix tetrasperma. Leaves.
Bambusa Leaves.

SACRED PLANTS.

PLANTS MENTIONED IN THE RELIGIOUS BOOKS, AND USED IN THE RELIGIOUS CEREMONIES OF THE HINDUS.

THE Hindus hold the belief that the gods inhabit or frequent all sweet-scented or flowering plants;—such as are neither, being haunted by evil spirits. As might, therefore, be naturally expected, a good many plants are worshipped or used in some of their religious ceremonies. The most important are the following :—

Butea frondosa. *Palas.*
Prosopis spicigera. *Shami.*
Bauhinia racemosa *Apta.*
Calotropis gigantea. *Rui*
Achyranthes aspera *Agarah*
F. glomerata. *Umbar*
Ficus Bengalensis. *Vad*
F. religiosa *Pipal.*
Cynodon dactylon. *Dub*
Eragrostis cynosuroides. *Kush.*
Eugenia jambolana *Jambul*
Mangifera Indica. *Amb.*
F. cordifolia. *Pair.*
Ocymum sanctum *Tulas.*
Phyllanthus emblica. *Aula.*
Musa paradisiaca. *Kela*
Ægle marmelos. *Bel*
Saraca Indica. *Jassundi, asok*
Cucurbita pepo. *Kohala*
Cucumis sativus. *Kakdi.*
Pandanus odoratissimus. *Keuda*
Melia azadirachta. *Nim.*

Butea frondosa. *Palas.*—The leaves of this plant are trifoliate; the middle leaflet is supposed to represent Vishnu, the left Brahma, and the right Shiv: hence its worship is enjoined in *Chaturmás Máhátma.* Hence also its use in the following three great ceremonies :—

Sacred Plants.

1. The leaves are used as platters on the occasion of the investiture of the sacred thread, when a particular part of the ceremony, called *chewul* (that is, when the barber removes the last tuft of hair from the head of the child to be invested), is being performed.

2. The dry twigs under the designation of *samidhas* are used for the feeding of *hom*, or sacred fire, in the ceremony which goes under the name of *nava grahas*, celebrated to secure the pacification of the nine planets (*nava* = nine ; *grahas* = planets) on the occasion of *vastu shanti*, *i.e.*, entrance into a newly-built house, or one acquired from a non-Hindu.

3. The stem is used as a staff on the day of *sodmúnj*, a part of the thread ceremony.

Prosopis spicigera. *Shami, shamri.*

The worship of this tree is enjoined at page 153 of *Vratraj* (selections from *Bhávishya Purán*) to be performed on the tenth of *Ashwin Shudhapaksha* (*Dasera* festival). This day, also called *vijaya dashmi*, is selected on account of its being the one on which Arjún—one of the Pándavs—took down the weapons he had left on this tree many years before, and fought one of his memorable battles with them. The tree is worshipped to obtain pardon for sins, success over enemies, and the realization of the devotee's wishes. It is believed that *Shami* is transformed into the goddess that pleased Rám. The dry twigs are employed as *samidhas* for feeding the sacred fire already described. The leaves, as *patri* (leaf-offerings), are used in the worship of Ganpatti, being thrown at the feet of that god's idol.

Bauhinia racemosa. *Apta.*

An account of the way this tree is to be worshipped, is found in *Dharm Sindhu* in the Vol *Deitya Parichhed*, Section *Ashwin Máhátma*, Chapter *Vijaya Dashmi*.

This chapter tells us that this tree, called *ashmantak* (its Sanskrit name), must be worshipped instead of *shami* if the latter cannot be found. A complete narrative of this legend is also to be found in *Sahadri Kand*.

In the villages of the Konkan where *shami* does not grow, the ceremony of the worship of *apta* is performed somewhat as follows :—

Early in the morning, people dressed in rich clothes assemble together, and in procession go outside the town to where the *apta* tree may be, and there after a priest has recited some prayers prescribed in the ritual, the chief man of the town cuts a bough of it, the other people following him. These boughs they take along with them, and going to the nearest temple, usually of a goddess, worship her, and make her an offering of a few of the *apta* leaves, together with flowers of *Tagetes patula* (French marigold), and blades of rice and corn.

On returning home they first make an offering of the remaining leaves to their household gods, then to their priests accompanied by some copper or silver coins, and to their parents and guardians,

or to the elderly people in the house; and, lastly, to their friends, saying: "Take this gold"; for the Hindus believe that the leaves over which the *muntras* are recited, are worth gold, or transformed into gold. Sacred Plants.

In Baroda this ceremony is performed with great pomp, the procession being headed by the Gáikwár himself, who is the first person to cut down the bough.

In Bombay there are two *shemi* trees, one at Mumbádevi and the other at Rámbagh, planted many years ago. Here the people go and worship these trees on the *Dasera* day, and afterwards they proceed to the temple of Mahálaxmi, carrying along with them the leaves of *apta*, flowers, rice and corn blades, and make an offering of these to the goddess, as already stated. A great quantity of boughs is sold in streets and near the temples on this day.

On the tenth day of the month of *Ashwin*, the *Dasera* festival is held, and during the nine preceding days, Hindus perform in their houses certain ceremonies.

On the morning of the first day of *Ashwin*, they raise a sort of altar or seat, called *ghat*, for the gooddess Bhagwati. There are two methods of putting up this altar—the wet (*ola*) and the dry (*suka*). The wet is gone through in the following manner. On a raised seat is placed a copper or wooden tray filled with earth, on which wheat, rice and other grains are sown and watered. Over the top of this mound of earth they keep a copper or silver pot, called *tambya*, filled with water, and besmeared on the outside with *gandh*. A betelnut and some copper or silver coins are also put into the pot, over the *tambya* are fixed three or five betel-leaves (never two or four), and over these again a cocoanut on which is drawn with soot a human face (nose and eyes), sprinkled over with *kunku*, and covered with a hat, or rather a flat cap made of betel-leaves and the midrib (*rid*) of the leaves of the cocoa palm, tipped with the flowers of the French marigold. A canopy made of bambu, tastefully decorated with the choicest of flowers, is fixed right above this altar to a hook in the ceiling, and from which the light orange-coloured *kawndal* fruits (*Trichosanthes palmata*) and coloured glass globes are hung.

Before this altar, which is left standing for the space of nine days, every night one or more chapters from the sacred book, called *Sapta-siti-pat*, are read by the family priest; hence these devotions or readings are called *navratra* (literally nine nights) in honour of *Shri Bhagwati*, usually called *devi*. On the tenth day this altar is removed, the cocoanut is broken, and the kernel mixed with sugar is distributed among relatives and nearest friends; while the rice and corn plants, which have by this time grown to a pretty good height, are worn in the turbans.

The dry ceremony is performed in the same manner as the wet one, the only difference being that, instead of a mound of earth, a lot of dry rice is piled on a *chavrang*.

Sacred Plants.

On the midnight of the eighth day the *hom* ceremony is performed by some Hindus, and *purnávat* (rice, salt, etc.,) are thrown into the *hom* to appease the hunger of *Shri Bhagwati*; and on the ninth all the sacred books and weapons, if there be any at home at the time, are worshipped.

Calotropis gigantea *Rui*.

In *Chaturmás Máhátma*, Chapter XX, in the narration of *Gallava Rushi* taken from *Skand Purán*, this tree is mentioned to be the transformation of *Surya*, or the sun. It is used in various ceremonies, both religious and those of time-hallowed custom. The leaves are used as *patri*, in the same way as those of *shemi* in the worship of Ganpatti, Haritáliká, Pitthori, etc. They are also employed in *shusti pujan* (a ceremony performed on the sixth day after confinement for propitiating "Jewti", the goddess of destiny) by females. When a Hindu is to marry a third time, it is believed that the third wife will soon die; in order to avoid such a calamity, the man is first married to this tree, which is then cut down. This ceremony is believed to ensure the longevity of the fourth, but really the third wife whom he now marries.

It is ordered in the *Shrávan Máhátma* to worship Máruti (who is also known as Hanumán) or the monkey-god on every Saturday with a garland of the flowers of this tree, which are then offered to him. The twigs are also ordered to be used as substitutes for tooth-brushes in the Smritisar Granth. They are also employed as *samidhas* for the feeding of sacred fires, as mentioned before.

Achyranthes aspera. *Agarah*.

A very common, ash-coloured shrub, about 3 feet high. Leaves obovate rotund; branches 4-sided; spikes very long and slender; flowers purplish-green, shining; lateral bracts rigid and prickle-like.

In *Chaturmás Máhátma*, Chapter XX, this plant is mentioned as the transformation of Budh. In *Smritisar Granth* it is ordered to be used as a tooth-brush. In *Vratráj* (page 85) it is directed that on *Bhádrapad shudh* 5th, females should wash their months with 108 pieces of this plant, using them as tooth-brushes; but in case of need the number may be reduced as low as seven; also to bathe 108 times, keeping each time a leaf of this plant on the head. It is also used as *samidhas*. In *Shrávan Máhátma*, Chapter XIII, it is recommended to worship Ganpatti with the leaves of this plant on *Shrávan shudh* 4th. The same god is similarly worshipped on *Bhádrapad shud* 4th (or Ganesh Chaturthi).

Ficus glomerata. *Umbar*.

In Chapter XX of *Chaturmás Máhátma* it is mentioned that *Shukra* (teacher of the demons) was transformed into this tree. Its stem is used as a nominal prop for *mandaps* on the day of *Medmuhurth*—a ceremony performed a day or two before marriage. Its leaves are used as *patri* in the worship of Ganpatti, etc. The fruits are strung and put round a pregnant woman's neck on a particular day during the eighth month of pregnancy. This is not done by all, some using, instead, the flowers of various plants. It is mentioned in *Guru Charitra*, Chapter XIX, that *Guru* or the god *Datta* or *Dattatri* lives on this tree for ever. The fourth incarnation of the Hindu god named *Narashinh*, after tearing the demon

Hiranya Kashappu with his nails, relieved himself of the demon's poison by inserting them in the stem of this tree. Hence it is considered sacred, and worshipped. Sacred Plants

Ficus Bengalensis. *Vad.*

In Chapter XX of *Chaturmás Máhátma* it is mentioned that Bráhma was transformed into a *vad* tree. Its dry twigs are used as *samidhas* for producing sacred fire. The leaves are employed as one of the *panch pallavs* or platters, and also for pouring libations. In *Vratráj*, page 267, females are ordered to worship this tree on *Jesht shudh* 15th, to water it, to wind a thread round it, and to worship it with *gandh*, flowers, etc., and make *pradakshanas* (go round it a certain number of times). They are further ordered to praise it, and to pray to it for the survival of their husbands and for the fulfilment of their wishes. They are also told that by worshipping this tree they secure one of the heavens named *Shivloke*. The reason of this worship is given at page 42 of *Vrat Kaumudi*, wherein it is mentioned that *Sávitri*, the wife of *Satyáwán*, worshipped this tree, and thereby got back her deceased husband. At page 78 of the same book it is stated that they should perform the thread ceremony of this tree and its marriage with the *durva* plant *(Cynodon dactylon)*.

Ficus religiosa. *Pipal.*

Chapter XX of *Chaturmás Máhátma* tells us that this tree is the transformation of the gods' *Guru*, and is termed *ashwath*. The cause of this transformation is mentioned in Chapter IV of *Kartik Máhátma*. It is stated in *Chaturmás Máhátma* that this tree is frequented by all the gods, and it is, therefore, ordered that it should be watered, worshipped, and *pradakshanas* performed round it. It is enjoined in the *Shrávan Máhátma* to worship this tree on every Saturday of the month *Shrávan*. On page 39 of *Vrat Kaumudi* is ordered the worship of this tree on every *Somvati*, *i. e.*, on every Monday on which a new moon should happen to fall. At page 342 of *Vratraj*, *Atharwan* tells the *Rushis* how to worship this tree; and *Valkhilya* mentions how Vishnu became a *pipal*. At page 65 of the same book is ordered the performance of the *múnj* or thread ceremony of this tree; at page 75 its marriage with *tulas (Ocymum sanctum)*. The tree is also used in *samidhas* and for platters in *panch pallov* and for pouring libations.

Cynodon dactylon. *Dub* or *durva.*

Chapter XX of *Chaturmás Máhátma* says that this grass is the transformation of *Ráhu*. At page 124 is given a description of the *Durva ashtámi*, *i. e.*, its worship on *Bhádrapad shudh* 8th. It is said that on this day the Hindus are ordered to go to this plant, pray to it, pluck it up from the ground, and bring it home, and worship it along with *Shiv;* pray to her (*Durva* is a goddess) to increase his family, as it (or she) is very fertile and gregarious. At page 156 of the same work is ordered the worship of *Ganpatti* with six *durvas*, etc., every day. At page 78 is ordered the marriage of this plant with *vad* or *war*.

Sacred Plants.

Eragrostis cynosuroides. *Kush* or *darbh.*

It is mentioned in Chapter XX of *Chaturmás Máhátma* that this plant is a transformation of *ketu*. Chapter XXVI of *Shrávan Purán* orders that these darbhs should be pulled out of the ground on *Pithori Amvdshya*. Unless this is done, the plants are not considered fit for use in sacred ceremonies. They are also employed in various funeral rites, such as *tarpan*, etc.

Eugenia jambolana. *Jambul.*

The god *Megh* is said to have been transformed into a jambul tree. The colour of the fruit being dark like that of *Krishna*, this plant is very dear to him; it is, therefore, worshipped, and Bráhmins are fed under it. The leaves are used as platters or *panch pallows* and for pouring libations.

Mangifera Indica. *Amb*

In Chapter XX of *Chaturmás Máhátma* it is said that this tree is the transformation of the god *Prajapatti*. In *Smritisar Granth* the twigs of this tree are ordered to be used as tooth-brushes and its leaves as platters in *panch pallavs* and for pouring libations; and flowers in the worship of *Shiv* on the day of *Maha Shivrátri* in the month of *Mágh*. The leaves are also employed in adorning *mandaps* and houses on occasions of various ceremonies.

Ficus cordifolia *Pair*

The leaves are used in *panch pallavs*

Ocymum sanctum *Tulas.*

This is the holy basil common in all Hindu gardens and temples. Chapter XVII of *Chaturmás Máhátma* tells us that it is a goddess, and should be watered and worshipped daily, at least in *Chaturmás*, *i. e.* from *Ashad shudh* 11th to *Kartik shudh* 11th. The worship of this tree and its marriage with the god *Krishna* is mentioned in Chapters XIX, XX and XXI of *Kartik Máhátma* in selections taken from *Sannat Kumar Sumvhita*, also at page 72 of *Vrat Kaumudi*. At page 301 of the same book is ordered the *tulasi laksha vrat*, a ceremony performed when a vow is made, which consists in offering a lac of the leaves, one by one, to *Krishna*, the performer fasting until the ceremony is complete. It is said that Krishna recommended his king *Udeshtir* (Dharmráj) to perform this worship.

Phyllanthus emblica. *Aula*

Chapter I of *Kartik Máhátma* orders the worship of this tree and the feeding of a Bráhmin couple under it, whereby all the sins are washed off. At page 73 of *Vrat Kaumudi* is ordered the *vrat* and worship of this plant

Musa paradisiaca. *Kela*

At page 251 of *Vratráj* it is ordered that females should worship this tree on the 4th of *Kartik shudh*, whereby their husbands are said to survive them, and their life is lengthened. This tree is also worshipped on the 3rd of *Shrávan*. The stems of the plants, laden with their long rachises of fruits, are invariably placed by the natives at the entrance of their houses, during their marriage or other festivals, as appropriate emblems of plenty and fertility.

Ægle marmelos. *Bel* or *beli.*

In Chapter XVIII of *Chaturmás Máhátma* is mentioned the origin of this tree. Its leaf is the symbol of the Hindu triad, and represents *Brahma, Vishnu* and *Mahesh* (Shiv). It is employed as *patri* in worshipping the deity Shiv. At page 352 of *Vratráj*, taken from *Jaimini Aranya Katha, Durvas Rushi* orders *Draopadi*, the wife of *Pándavs*, to observe the *bel laksha vrat*, *i. e.*, the worship of *Máhádeo* with a lac of the leaves of this tree.

Saraca Indica (Jonesia Asoca). *Jassundi, asok.*

This is a small, handsome tree. Leaflets 6-12, oblong, lanceolate, 3-9 in. long. Flowers of a beautiful orange colour, collected in dense cymes at the ends of branches. Pod scimitar-shaped, 4-10 in. long, 4-8-seeded. Common in the Southern Konkan.

At page 224 of *Vratráj* it is ordered to worship this tree on *Chaitra shudh* 13th. It was under this tree that *Sitá*, the wife of *Rám*, passed her days when she was carried away and imprisoned by *Rávan*, and I believe that it is so named because under it she was relieved of her grief (*a*=away from ; *shoke*=grief)

Cucurbita pepo. *Kohala.*

Page 46 of *Vrat Kaumudi* recommends the worship of this tree, considering it a goddess. *Dharmráj* tells *Krishna*, and *Narad* priest of the gods tells king *Chandrasen* to observe the *vrat* of this cucurbitaceous plant (*vide* page 370 of *Vratraj* in selections taken from *Padma Purán*). Its fruit is also cut with some ceremony, called *kohala muhurt*, a day or two before a marriage.

Cucumis sativus. *Kakdi.*

At page 371 of *Vratráj* it is related that *Suth* told the *Rushis* and *Shiv* told his wife *Párwatti* to worship this tree, as by doing so females do not lose their husbands, or that these survive them The fruit of this tree is cut into thin slices, and employed in the worship of snakes on *Shrávan shudh* 5th (*nágpanchmi* day). It is likewise employed in the worship of many other gods.

Pandanus odoratissimus. *Keuda.*

Chapter III of *Kartik Máhátma* relates that this plant is cursed by *Shiv* for telling a lie and giving false evidence on the occasion of a dispute between *Shiv* and *Vishnu*. But he again took pity on it, and ordered that he *(Shiv)* should be worshipped with this plant on the day of *Shivratri*. The plant is also employed in the worship of many other gods.

Melia azadirachta. *Nim.*

When nectar was being taken to heaven from the world below for the use of the gods, it is believed that a few drops of it fell on this tree. Hence on new year's day of *Shahalivan shak*, Hindus eat its leaves in the hope of thereby acquiring freedom from disease.

Ipomœa pes-capræ. *Marayada vel* or *marja vel.*

The following curious practice is observed by Hindus at Bassein and some villages of the Konkan, though I have found no authority on this subject in their sacred books :—

Sacred Plants.

This creeper is twined round the cot of a Hindu mother on the sixth day after her confinement, and is intended to serve as a protection to the new-born babe against any evil effects that might arise from the visit of *Jewti* or *Satvi* (goddess of destiny), who is supposed on this day to call for the purpose of writing the child's destiny on its forehead, and sometimes even carry it away. The notion of this creeper being used in the manner above described, seems to be probably suggested by the fact that as it grows on the sea side, and serves to bind the sands together, and prevents the encroachment of the sea, it might, so to speak, be used to bind the child to its mother, and prevent the effect of *Satvi's* evil intention.

Satvi is also propitiated by feasts (the members of the family keep a watch on and pass the fifth and sixth nights in jollity) and worship. This worship is of two kinds: one consists in drawing on the wall a female picture over whose face another face, made of dough is stuck and in whose four hands are four cradles with a babe in each. The figure is dressed in a cloth dyed with turmeric, and beneath it (the figure) is placed a stone, the one used for grinding *masala*, covered over with leaves of *rui (Calotropis gigantea)* having the figures of children drawn on them with red lead. Both the figures on the wall and on the leaves are then worshipped, different kinds of flowers and sweetmeats (usually gram and sliced cocoanut) being offered to the goddess. These sweetmeats are afterwards consumed by each and every member of the family and distributed among their friends. A widow in the family generally conducts this ceremony. The other form of worship, which is conducted by the father of the child, consists in placing on a four-footed stool *(chavrang)* a piece of gold or silver of the size of a four-anna piece with a female figure stamped on it and a handful of rice. These are then worshipped, and the gold or silver piece is subsequently tied round the neck of the child to guard it against any danger to its life. This ceremony is known by the name of *jivti pujan*.

Putranjiva Roxburghii.

The black nuts of this plant are made into necklaces or rosaries, and are put round the necks of children, as it is supposed that they have the power of warding off diseases caused by evil sight. Hence its name *putra jiv*=life of a child.

Melia azedarach.

The nuts are frequently strung and worn round the necks, and during the prevalence of epidemics of small-pox, etc., are suspended over the doors and verandahs.

Symplocos spicata. *Lodh.*

The fluted seeds are put round the necks of children as necklaces, to avoid evil spirits.

The rosaries made of the fruits of the following plants are worn as religious emblems:—

Elæcarpus ganitrus. *Rudraksh.*

This plant is to be found on the higher ghâts. The five-grooved and elegantly tubercled nuts are worn in the form of necklaces by

shivbhaktas (worshippers or followers of *Shiv*) in order to obtain *sivlocke* (*i.e.*, heaven wherein the god *Shiv* resides) and to gain his graces. A good account relating to this practice is to be found in *Sivlila mrut.* The plant being rare on our ghâts, the nuts are imported in large quantities from Singápore, Nepál, etc. I believe that beads are manufactured of the *aloes* wood *(Aquillaria agallocha)* and perhaps of some other trees. Sacred Plants.

Elæocarpus tuberculatus.

The nuts of this tree are also worn as necklaces.

Ocymum sanctum. *Tulas.*

The *Vishnuvas* wear necklaces made of the root or stem of this shrub.

Many plants, besides the above, are ordained by the sacred books of the Hindus to be used in religious ceremonies; a lengthy description of them would be beyond the scope of this paper. I shall, therefore, describe, as shortly as possible, the way the daily devotions are made, and mention the flowers and other vegetable substances used in their performance.

The gods, after being bathed (literally) in holy water (or water over which certain *mantras* are recited) and then dried with a towel, are placed in a copper dish according to their piously supposed rank. By some they are kept on a *chavrang*, a sort of small wooden altar. Then *gandh* (sandal-wood rubbed on stone which water) is applied to their heads or foreheads, followed by *akshata* (blessed rice) which is pressed or stuck over the *gandh*, then flowers of various hues are thrown over the head of each image, taking care to offer, whenever possible, those flowers which are most acceptable to each god. Then the images are dusted over successively with a pinch or two of "*abhir*", "*gulál*", "*halad*", "*kunku*" and "*shendur*" (red lead). At the end of this "*arti*", a lighted lamp fed with ghee is shown to or carried over the heads of the gods, and a food called "*nayaved*" is offered to them, the whole ceremony being wound up by burning a small bit of camphor and "*udbatti*" or "*agarbatti*". During the whole of the time the ceremony is being performed, both the hands and the mouth are constantly engaged.

Explanation :—

In the Hindu worship above described the images of the following five gods are indispensably present, *viz.*, *Shiv*, *Vishnu*, *Ganpatti*, *Surya* (sun) and one *devi* named *Anupurna* (an incarnation of *Párwatti*) the supplier of food. These five gods form the *Panchayatan.* To them are added the *penates*, or images of household gods, varying in number according to the wishes of the devotees.

Abhir is of a brown colour, and composed of various odoriferous substances.

Gulál is a reddish powder, made of the flowers of *Butea frondosa*, called *kissu* in Gujarát. It is also made of sapan wood *(Cæsalpinea sapan)* and of starch obtained from the tuberous root of an aroid or some other plant.

Halad is turmeric, the tuberous root of *Curcuma longa.*

Sacred Plants.

Kunku is the powder of the tuberous root of *Curcuma longa*, coloured red by being immersed for some days in some alkaline solutions, generally of lime water.

All these substances are, of course, pulverised before being used. *Halad* and *kunku* are sprinkled specially over the head of the *devi*; and *shendur* specially over *Ganpatti*.

Nayaved may either consist of sugar alone, or milk and sugar, or any cooked food. When only of sugar or milk, it is offered in a brass cup, or one of any other metal; but when it consists of any cooked food, it is offered in a brass dish only. This dish is placed on the ground, in a square previously marked out with the fingers dipped in water. The worshipper, who during the whole ceremony squats on a very low stool, then takes two leaves of *Ocymum sanctum (tulas)* in his right hand, dips them in water, throws one on the food and the other, after five peculiar motions of the hand, on the gods, keeping during this time his eyes closed with the left hand.

Camphor is the concrete oil of *Cinammomum camphora*, a plant of China, Japan, Cochin China, etc., now introduced into Java.

Udbatti is composed of several odoriferous substances, the chief ingredient being benzoin, a balsamic exudation procured by making incisions into the bark of a tree named *Styrax benzoin*, indigenous in Borneo, Java, Sumatra and Siam.

Agarbatti is also composed of several substances, the chief of which is aloes or eagle-wood *(Aquillaría agallocha)*, a tree growing in Bengal.

All the ingredients composing these two *battis* are made into paste, and then rolled into thin sticks, generally of the thickness of a small quill, and then dried. Either the one or the other is used according to the fancy and means of the devotee.

In the selection of the flowers to be offered to the deities, colour is carefully attended to. During the worship of the deity *Shiv*, white flowers are offered (those of water-lilies *nelumbium* and *nymphœa*, named *kamals*, being preferred); other colours are considered inadmissible. The leaves of *bel* tree *(Ægle marmelos)* are also offered; the whole leaf (not the leaflets) must be used. No other god is worshipped with these leaves.*

Pandanus odoratissimus is cursed by *Shiv*: so its flowers, though acceptable to the other gods, are not used during his worship, except on one particular occasion (*see* what is stated in the sacrificial woods about this plant).

Vishnu receives either white or red flowers or those of any other colour. He is the only god who is worshipped with *Ocymum sanctum (tulas)*.

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* In Chapter XVIII of *Chaturmás Máhátma* it is stated that other gods may also be worshipped with these leaves, but it is never done.

To *Ganpatti* is offered flowers of all colours, but red are preferred, specially those of *Nerium odorum (kanir)* and *Hibiscus rosasinensis (jasvand)*; yellow and white varieties are not rejected. During his worship, *durva (Cynodon dactylon)* is absolutely necessary. This is a common grass called *huryialli*, but known as *durva* or *dub* in religious books and during religious ceremonies. Sacred Plants.

Surya (Sun.) It is believed that white and yellow flowers are disliked by this god, and red preferred. Hence the red varieties of *Nerium odorum* and *Hibiscus rosasinensis* are only selected for offerings, the white and yellow flowers being rejected. It may be for this reason that, in the gardens of Hindus, the red varieties of the trees above mentioned are usually to be found. On some occasions *durva* is offered to him.

Devi.—Flowers of all kinds are offered to her; *kunku* and *halad* (turmeric) mentioned above, are particularly placed over her head.

Gaur.—The goddess of this name is much pleased with yellow flowers of *Thespesia populnea (bhendi)*: hence these are invariably offered to her during her worship. The same flowers are also offered to *Ganpatti* and other deities, male and female, which are not particularly averse to yellow colour.

Shank (shell) is worshipped with *gandh* and flowers, but no rice is put over the *gandh*.

Hunumán.—Leaves and flowers of *Calotropis gigantea* are sacred to *Hanumán*, and are used during his worship.

Manja.—*Euphorbia nerifolia (thor)* is sacred to the goddess of serpents.

Lakshmi.—This goddess resides or has her abode in the central yellow part (stamens and stigmas) of *kammal* (flowers of *nelumbium* and *nymphœa*), but any flower can be used during her worship.

The spiral vessels which abound in the leaves and scapes of the water-lilies, after being carefully gathered, are made into wicks for lamps, which are lighted by the Hindus in the shrines of their idols.

The five flowers that tip the five arrows of *Kámadev*, the Indian Cupid, are—

Michelia champaca. *Champa.*

Mesua ferrea. *Nágkeshar.*

Pavonia odorata.* *Bala.*

Mangifera Indica. *Amb.*

Pandanus odoratissimus. *Keuda.*

Ganeshwar.

The handsome tree *Cassia fistula*, called *bawa* in Bombay and [illegible] in Karnátak, is held sacred to *Ganeshwar*, the St. Januarius of

* This is a small, herbaceous plant with cordate 3-5-lobed leaves, pink flowers, clustered at the ends of branches, common in various parts of India and Ceylon.

Sacred Plants

India; the people in Mysore put stakes of it in the ground and worship them.—Graham's Cat. Bombay Plants.

Nyctanthes arbortristis. *Parijatak.*

This tree is supposed by the Hindus to have been brought from heaven by the god *Krishna* for his wife *Satyábháma*, on account of the fragrance of its flowers. Hence the use of its high-scented flowers in the worship of all the gods.

Anthocephalus cadamba.

The flowers of this plant are also much esteemed in some parts of India where this plant is common.

Stereospermum chelonoides.

The highly scented flowers of this plant are also much used by some people as an offering to the gods.

Cratæva religiosa, Dalz & Gibs Bby. Fl 8. *Narvala, varna.*

Drury states that "in the Society Islands, of which this tree is a native as well as of 'Malabár, it is planted in burial grounds, being esteemed sacred to their idols.' Probably this is the reason why it is named *C. religiosa*, for, so far as my enquiries go, it is not mentioned in Hindu religious books, nor used in their worship.

Gossypium.

The sacred thread of the Hindus must, according to the institutes of Manu, be made of cotton only. And, moreover, this thread should be spun, tied and finished by a Brahmin alone; no person of any other caste being permitted to prepare it. (See Fibrous Trees.)

Crotolaria juncea, Dalz. & Gibs Bby. Fl. 51. *Sunn, tag.*

The great Hindu lawgiver Manú enjoined on the *Shkatrias* the use of the sacred thread of *sunn*. It appears that Manú, being a Bráhmin, always tried to keep this distinction, and claim superiority to his class. But, now-a-days, the sacred threads of almost all the Hindus are made of cotton.

The common sacrificial woods of the Hindus on this side of India are:—

Butea frondosa. *Palas.*

Prosopis spicigera. *Shemi.*

Calotropis gigantea. *Rui.*

Achyranthes aspera. *Agarah.*

Ficus glomerata. *Umbar.*

Ficus Bengalensis. *Vad.*

Ficus religiosa. *Pipal.*

Cynodon dactylon. *Dūb.*

Eragrostis cynosuroides. *Kush.*

The five leaves *(panch pallav)*, used by the Hindus of this side of India as platters and for pouring libations, are gathered from the following trees :— Sacred Plants.

Mangifera Indica. *Amb.*

Eugenia jambolana. *Jambul.*

Ficus Bengalensis. *Vad.*

Ficus cordifolia. *Pair.*

Ficus religiosa. *Pipal.*

Lea macrophylla. *Dinda.*

The large leaves of this plant are used as platters for food every Monday during the month of *Shrávan.*

It appears that the Hindus are enjoined not to use tooth-brushes made of plants the sap of which is coloured; those only being lawful whose sap is colourless. *Smritisar Granth* gives a long list of plants the twigs of which can be used for the purpose. The following are a few of them which have been identified :—

Bocagea Dalzellii. *Sajiri.*

Ægle marmelos. *Bel.*

Feronia elephantum. *Kavit.*

Zizyphus jujuba. *Bor.*

Mangifera Indica. *Amb.*

Butea frondosa. *Palas.*

Acacia catechu. *Kair.*

Albizzia Lebbeck. *Shiris.*

Anthocephalus cadamba. *Kadam.*

Calatropis gigantea. *Rui.*

Wrightia tinctoria. *Kuda.*

Achyranthes aspera. *Agarah.*

Briedelia montana. *Assana.*

The fruits of *wagatti (Capparis brevispina)* and of *gometti (Melothria heterophylla)*—*Bryonia umbellata* of Dalzell and Gibson—are eaten on *duadashis* which occur in the month of *Ashad.* The two fruits are invariably associated in the *bháji* or dish made for those days.

Smithia sensitiva. *Kaola.*

Eaten at all seasons as a pot herb, as stated elsewhere; is especially used on every Monday of *Shrávan.*

Cassia tora. *Takla.*

Is also eaten as a pot herb in this district by some people.

Sacred Plants.

On Saturdays of the same month *Shrávan* the Hindus prepare a kind of *bháji* (called *panch-bhelli-bháji*) of the following five plants:—

Cassia tora. *Takla.*

Bauhinia Malabarica. *Koral.*

Amaranthus oleraceus. *Mat.*

Celosia argentea. *Kurdu.*

Phalangium tuberosum. *Kuli.*

Mat is always taken, even if any one or more of the others be wanting. This kind of food is partaken of, because it is believed to be particularly acceptable to the gods.

Eclipta prostata. *Maaka.*

Is used in worship on the days when *shrádh* (office for the dead or ceremony in honour of the dead) is performed. The leaves of this plant and of *Ocymum sanctum* are thrown over the ball of cooked blessed rice (now called *pind*) made in honour of the dead. I believe some people use also the leaves and flowers of *augusta (Sesbania grandiflora).*

A branch of *gometti (Melothria heterophylla)* is suspended by some people over the hood of the idol of cobra on *nágpanchmi* day, or during his worship.

These notes were drawn up from information supplied to me by an intelligent Bráhmin, and confirmed by a Hindu friend acquainted with the subject.

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THE

BOTANY

OF THE

BOMBAY PRESIDENCY.

BY

DR. W. GRAY.

B 308—40

THE
BOTANY OF THE BOMBAY PRESIDENCY.

To furnish an even tolerably accurate account of the Botany of Western India is assuredly a task of no small difficulty. The main obstacle in the way of its fulfilment is the unmethodical and fragmentary manner in which the subject has hitherto been studied, and the next, our very imperfect acquaintance with the botanical features and products of some of the more remote and less known districts of the Presidency, especially those parts of it which are under native rule. Through the labours of such able botanists as Sykes, Law, Graham, Stocks, Gibson, and Dalzell, a vast deal has already been accomplished. Much still remains to be done, and good work is even now in active progress—carried on by enthusiastic botanists whose labours will one day bear valuable fruit. When the botany of this Presidency and its dependencies shall have been fully worked out, and sufficient materials collected, it is to be hoped that some person may be found competent to undertake the task of preparing, on a new and enlarged scale, a comprehensive scientific guide to the Bombay Flora.

In this paper I purpose to include only a short description of the boundaries and extent of the Bombay Presidency, and its division into botanical provinces; the distribution in detail of the natural orders throughout the Presidency, with some account of their economic uses, and also those of the more important naturalised and cultivated plants belonging to each. I shall next offer some general observations on the vegetation of Western India, on the number and comparative development of the natural orders, and on the number and comparative frequency of species and individuals; and it will, lastly, be necessary to consider the subject of distribution, especially as influenced by climate, soil, exposure, and elevation.

The nomenclature of Indian plants is a subject of which the bare mention is sufficient to raise a host of difficulties. When the Flora of a country is explored by a number of botanists working at different times, each independently of the other, and in some cases in ignorance of the labours of those who have gone before, it is not extraordinary that to a very great extent new species should be instituted which will be found by a more careful observer to have been already described. There is no circumstance by which so many difficulties are thrown in the path of the student of Indian Botany as the incredible number of synonyms possessed by single plants.[1] The identification

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[1] For example, *Cissampelos Pareira*, a common climbing plant of the Konkan jungles, has been described under eighteen different names by various collectors. A plant with six or eight names is quite an ordinary occurrence. *Allophylus Cobbe*, a climbing shrub belonging to the natural order *Sapindaceæ*, possesses, according to Hooker's Flora of British India, no less than thirty synonyms.

of a plant is thus often a work of time, solely in consequence of the numerous authorities which have to be consulted before the correct description can be found. In their imperfect definitions and sub-division of genera, Indian botanists have much to answer for; they have in this way not only introduced confusion into the old and well-defined genera, but they have also unnecessarily created new groups and sub-divisions which are of no practical value. Another prevalent evil is a tendency to the needless and excessive multiplication of species; this is mainly due to a deficiency in habits of accurate observation: the most trivial variations resulting from such causes as differences in climate, soil, aspect, and elevation being sufficient, in the judgment of some naturalists, to raise to the rank of distinct species individuals which might possibly have been the progeny of the same parents. The multiplication of species may also be attributed, in a great degree, to the want of harmony, just alluded to, between the labours of such a number of observers. It is inevitable that, under these circumstances, varieties of one species should be described as so many distinct species by an equal number of independent collectors. Nor are the records of Indian botany wanting in frequent examples where a detailed description of a species is drawn up by a botanist from observation of a single specimen, the variations of other individuals of the same species, no matter how produced, being ignored; it often hinders the prompt recognition of a plant, in consequence of the specific characters thus drawn being necessarily incomplete or even entirely erroneous. It may sometimes be a matter of nice judgment to determine to which description the particular specimen should be referred. That it is impossible to define a species accurately unless it has been examined in all its variations, is an important fact which is too frequently overlooked.

In the points above noted the Flora Indica seems to have suffered to a far greater extent than that of any other country. Dr. Hooker and Mr. Bentham, for their labours in reducing the number of genera and species, will deserve the grateful remembrance of all future botanists.

That part of the peninsula, commonly called Western India, to which the following detailed botanical description will apply, embraces within its limits the western half of the Deccan table-land; the Western Gháts; the Konkan; North Kánara; those parts of the Sátpuda hills within the Collectorate of Khándesh, with the neighbouring valley of the Tápti; Káthiáwár and Gujarát; and the western extremity of the Vindhya chain where it slopes downwards into the Rewa Kántha Country.

This great extent of territory it is necessary to divide into provinces in order to define clearly the range of the individual species comprised within its flora. Political or other arbitrary limits are here out of place; each province must be, above all other considerations, defined and characterized by its botanical features. The Presidency will thus almost naturally separate into five botanical provinces—namely, Gujarát and Káthiáwár, Khándesh, the Deccan, the Konkan and the Gháts, and North Kánara. Each one of these

is distinguished from the others by the possession of some characteristic forms of vegetation, and more especially by the general aspect and constitution of its flora. It must not, however, be assumed that all the species of a botanical province are to be found nowhere outside its geographical limits; on the contrary, the characteristic vegetation of one province passes by insensible gradations into that of another, so that, owing to the absence of any sharply defined limits, their botanical boundaries cannot be considered as more than approximative.

The physical features and climate of each province I now pass on to describe—not in any great detail however. This particular description is more especially demanded in order that we may appreciate clearly the influence which these exercise on the geographical distribution of plants and on the comparative development of any given provincial flora.

First in order comes the botanical province of Gujarát, including the peninsula of Káthiáwár. The river Tápti forms the southern boundary of Gujarát proper: it is bordered on the east by the table-land of Málwa; on the north-east it is separated from Meywár by a range of hills extending from the river Mahi by Dongarpur to below Mount Abu; on the north it is limited by Márwár; and on the west by the Ran and the Gulf of Cutch. The province easily falls into three divisions, which differ from one another in physical features to a very marked degree. (1) The central portion, embracing the alluvial country along the Gulf of Cambay, the Pálanpur State, the western parts of Mahi Kántha, and the northern parts of Káthiáwár, is almost perfectly flat. Half the Surat district, together with the districts of Broach, Kaira, and Ahmedabad, and the neighbouring portions of the Baroda territory, with parts of Pálanpur and Mahi Kántha, are fertile, well wooded, and richly cultivated; but the north of Káthiáwár and the districts of Pálanpur bordering Márwár and the Ran are sandy, arid, and comparatively devoid of vegetation. The average rainfall at Broach and Kaira is 27 inches, at Ahmedabad and Pálanpur 22 inches, but towards Márwár and the Ran it is much less. The hot-weather temperature near the Gulf of Cambay is 91°, and in the vicinity of the Ran and Márwár it is known to reach as high as 115°; hot winds also prevail here. In the cold season the average daily temperature is about 70°. (2) The eastern portion of the province, comprising Rewa Kántha and the western slopes of the Vindhyás, the Panch Mahála, and the greater part of Mahi Kántha, is mostly hilly and clothed throughout with dense vegetation, principally forest. The geological formation is granite interspersed here and there with trap, slate, and limestone; the hills are separated by deep ravines. The hot and cold weather temperatures are much the same as the plains near the Gulf of Cambay. The annual rainfall is, however, considerably in excess; the average for Mahi Kántha is 33 inches, for Rewa Kántha and the Panch Mahála 36, and for Báriya 46 inches; and it is accordingly to this greater humidity that the luxuriance of the vegetation is due. The climate, from the close of the rains to the beginning of the hot season, is very unhealthy. (3) The peninsula of Káthiáwár, with the exception of its northern part, is

in general undulating. Towards the south it is traversed from east to west by a semi-circular range of hills, known as the greater and lesser Gir; this range throws off the rainfall into the Gulf of Cambay and into the Arabian Sea. Near Porbandar are the Barda hills, which are continuous with a range extending to the north-east, closely approaching the Ran, so that the rainfall of this part of the Peninsula is almost entirely sent into the Gulf of Cutch and into the Ran. The Gir is a succession of hills separated from one another by deep valleys, with their sides scored by steep-sided ravines, all clothed with dense jungle; during part of the year the climate is notoriously unhealthy. The Barda hills are also well covered with vegetation. The marine districts of the Peninsula are flat, with rich alluvial soil, and are well cultivated, while the central districts are rocky and possess but a very scanty flora. The temperature of Káthiáwár ranges from 50° in the cold to 104° in the hot season. The annual rainfall in the southern districts is between 30 and 40 inches, but the central and northern parts being screened by the hills from the rain-bringing winds, it is at Rájkot considerably less,—not more than 24 inches. The differences thus occasioned in the degrees of atmospheric humidity which exist in certain districts will in great part account for the varying character of the vegetation of Káthiáwár.

Khándesh.—This botanical province includes the valley of the Tápti from Burhánpur nearly to Surat, and the western half of the Sátpuda chain. South of the Tápti, it is bounded on the west by the Gháts, and is separated from the Deccan by the Silbári and Laling hills and their eastern extensions. The tálukás of Chálisgaon, Páchora and Jámner will be included in the description of the Deccan, to which province they belong botanically. The Sátpudás are formed of trap, are very steep, and are clothed on both sides with dense forest. The Tápti valley, with an elevation of about 700 feet, is perfectly flat and is in general fairly well wooded; about Sávda the country has quite a park-like appearance. That part of the Tápti valley which lies immediately below the southern slopes of the Sátpuda range is thickly covered with forest and jungle. The rest of the province south of Nandurbár is traversed from east to west by three parallel ranges of hills with flat country between. The hills are wooded, while the flat country is covered, more densely however towards the west, with low thorny jungle. Towards the east the land is more fertile and is fairly cultivated; in the river valleys and near the towns some fine timber is to be seen. Geologically the trap formation of the province is similar to that of the greater part of the Deccan, the land sloping gradually towards the Tápti. The temperature varies from 67° in the cold season to 93° in the hot season. The average annual rainfall at Dhulia is 21 inches; but on the hilly northern boundary this is more than doubled.

The Deccan.—The districts of this great table-land which lie within the limits of the Bombay Presidency are bounded on the north by Khándesh; on the east by the Nizám's territory; on the west the province is separated from the sea by the Gháts and the Konkan; and on the south it is bounded by Mysore. The mean elevation of the table-land is about 2,000 feet. Its geological forma-

tion is principally trap and laterite. The surface of its northern half is generally level and open, with isolated flat-topped hills dotted here and there, parallel spurs extending eastwards from the Gháts. The soil is comparatively shallow, there is little jungle, and, except near the towns and along the river banks, there is no timber. In the district of Dhárwár and the southern parts of Belgaum and Kaládgi the ground is more broken; instead of trap, we have granite, limestone, quartz, and sandstone making their appearance. In the western portion of Belgaum there is a good deal of jungle. In Dhárwár the soil is deeper and much more fertile than in other parts of the province, and a corresponding influence on the vegetation is the result. Along the eastern slopes of the Gháts are deep ravines, the sides of which are covered with jungle and scanty low forest. Altogether the flora of the Deccan, both in species and individuals, is far from being extensive. The cold-weather temperature is 68°, while that of the hot season seldom rises above 87°. The annual rainfall for Poona, Ahmednagar, and Shólápur averages 25 inches, Sátára 40, Kaládgi 15, Belgaum 38, and Dhárwár 29 inches.

The Konkan and the Gha'ts.—This province extends from the Portuguese territory of Goa to the Tápti, and may be separated into two divisions which entirely differ from each other in physical conformation. The Konkan or marine division consists of a narrow, partly alluvial, strip, with a breadth of from 20 to 30 miles, and whose mean elevation is hardly more than 100 feet. Some parts of it are hilly and covered with jungle; many of the hills are isolated, but others are western projections from the Gháts. The more level country is open and well cultivated. The Ghát division, or, to give it its proper appellation, the Sahyádri range, is a continuous chain of flat-topped hills beginning abruptly in the Tápti Valley, where they suddenly rise to an elevation of at least 2,000 feet, and extending almost directly southwards to Malabár. In some places, as at Mahábaleshvar, the hills attain a height of nearly 5,000 feet, but the mean elevation of the whole chain is scarcely more than 3,000 feet. Their western face is exceedingly precipitous, but to the east they slope gently into the plains of the Deccan. They are intersected by numerous valleys and ravines, at the bottom of which in the rainy season are raging torrents. The range, throughout its entire extent, is clothed from foot to summit with the densest vegetation, that growing in the valleys and ravines rising to the dignity of forest. At the northern extremity the unhealthy district known as the Dáng is covered with magnificent timber. The geological formation of the province is trap and laterite; the districts bordering the sea are, however, more or less alluvial, being formed in great part of the debris washed down from the hills by the monsoon rains. In the extreme southern portion metamorphic rocks begin to make their appearance, and these are continuous with the formation of the Goa territory and of North Kánara. Its climate may be classed as decidedly humid, not only from the abundant rainfall taken by the mountain chain from the south-west monsoon, but also by its proximity to the ocean, the sea breeze during the dry season tempering and rendering moist what would, in its absence, be an arid climate. The province enjoys,

too, a singularly equable temperature, ranging from 74° in the cold season to 88° in the hot season. Along the higher Gháts, however, the temperatures are much less, at Mahábaleshvar it is only 71° in the hot and 64° in the cold weather. The rainfall increases gradually from the sea level to the summit of the Gháts: at Bombay the average fall is 75 inches; at Ratnágiri, elevated 150 feet, it is 108: at Thána 91; at Máthcrán 175; at Dápoli 135; and at Mahábaleshvar it reaches its maximum, 254 inches. Towards the Deccan the rainfall rapidly decreases, and at Pánchgani, 4,000 feet above the sea and 14 miles east of Mahábaleshvar, it is only 50 inches. The moist atmosphere and abundant rainfall will thus account for the great luxuriance of the vegetation of this province; even at the driest season of the year it is more or less green, the country never presenting that burnt up arid appearance so generally observed at this period in the provinces previously described.

KÁNARA.—This province resembles in some respects the southern parts of the Konkan, from which it is separated by the Portuguese possessions. It is bounded on the east by the Dhárwár district and on the south by Mysore. The surface of the country is more or less hilly and covered with a luxuriant tropical vegetation. The marine alluvial strip is narrower than that of the Konkan, and presents a similar aspect. In the eastern and elevated two-thirds of the province are situated the most valuable and extensive forests in the Bombay Presidency. The geological formation is, like that of the Southern Marátha Country, all metamorphic. The temperature does not differ from that of the Konkan. The rainfall at Kárwár is 98 inches, and at Sirsi, above the Gháts, it is 89 inches. The province, from its greater nearness to the Equator, possesses a more humid climate than the Konkan, which fact, taken with the high and equable temperature, is sufficient to account for the predominance of heavier forest and the moisture-loving types of tropical vegetation. Except in the latter half of the dry season, the climate in the forest districts is well known to be exceedingly malarious, resembling in this respect the climate of the Dáng and of the eastern districts of Gujarát.

The foregoing sketch of the climate and leading physical features of Western India is necessarily very incomplete; on these matters fuller information will no doubt be obtained from the articles on geology and meteorology. I shall now proceed to give a somewhat detailed exposition of our indigenous natural orders, noticing too, in their proper places, the more important and best known of the naturalised and cultivated species, belonging to these and other orders, which are found growing on this side of India. It will be a more convenient plan to take this part of the subject with reference to the Presidency as a whole than to describe the flora of each province separately; such an arrangement as the latter would involve much needless repetition, and would besides unreasonably lengthen the article.

IN DICOTYLEDONS, the first great class of the vegetable kingdom, the following natural orders of the Bombay flora are included:—

RANUNCULACEÆ is represented in Western India by only seven indigenous species. It is essentially an order of temperate countries, its Indian

species being found chiefly in the mountainous regions to the north. The few Bombay members of the family are confined mostly to the Gháts and neighbouring parts of the Deccan. *Clematis*, a genus of climbing shrubs, has four representatives: *C. smilacifolia* occurs on the Southern Gháts and in various parts of the Konkan; *C. triloba*, a handsome species, and *C. Gouriana* are common climbers in the Ghát jungles, the latter bearing a considerable resemblance to the British plant *C. vitalba* or "Traveller's joy." *C. Wightiana* occurs at Mahábaleshvar. *Naravelia Zeylanica*, a climbing shrub, is found on the Southern Gháts; *Thalictrum Dalzelli*, a small stiff perennial herb, on some of the Deccan hills, and with it *Delphinium dasycaulon*, a plant with showy blue flowers. The latter also occurs in Abyssinia. None of the Bombay *Ranunculaceæ* are distinguished by the possession of any peculiar properties or uses. The poisonous *Aconitum napellus* or Monkshood, with one or two other flowering members of the order, are sometimes to be seen in Bombay gardens, where the Larkspur, *Delphinium formosum*, is also a familiar plant.

Dilleniaceæ.—Only two species of this order are known in Bombay. Both are middle-sized trees with splendid foliage. *Dillenia Indica*, found throughout the South Konkan, has large white flowers seven or eight inches across, a fleshy calyx possessing an acid flavour, and fruit the size of a cocoanut. The other species, *D. pentagyna*, occurs on the Gháts, in Khándesh, and in the Southern Marátha Country; the small yellowish green flowers, which appear before the leaves, are arranged in clusters along the lesser branches; the small fruit is edible. This order is widely distributed; it occurs abundantly in Australia, and is found also in the Eastern Islands, in many parts of India, in Madagascar, Africa, and America.

Michelia Champaca, a member of the Magnoliaceæ, an order nearly allied to the preceding, is a tall handsome tree with fragrant pale yellow flowers. It is indigenous to other parts of India, but is only found cultivated in Bombay.

Anonaceæ.—About half the species of this tropical natural family occur in India; a large proportion are found in tropical America, and the remainder in tropical Africa and the Indian Archipelago. Out of 191 Indian species no more than seven or eight are indigenous to Bombay, all these latter being, without exception, natives of the Konkan and Gháts. *Uvaria narum*, a climbing shrub with reddish flowers, is found on the Southern Gháts. *Unona pannosa* a tree, *U. discolor* a shrub, and *U. Lawii* a climber, occur in Sávantvádi. *Polyalthea fragrans*, a tree with long leaves and fragrant yellow flowers, is found in the same locality. *P. cerasoides*, a tree with green flowers and cherry-like fruit, is found in the Northern Konkan and on the neighbouring hills. *P. longifolia*, a tall handsome tree with very beautiful foliage, and a native of Southern India, is now to be seen in many parts of this Presidency. *Saccopetalum tomentosum* is a large tree growing on the Southern Gháts. None of the indigenous species of this order are noted for any useful or ornamental quality. Among the naturalised species may be mentioned *Anona squamosa*, the well-known Sweetsop, said to be indigenous to the Malay Islands, but more probably a native of tropical America; *A. reticulata*, the Custardapple or Bullock's heart, and *A. muricata*, the Soursop, are natives of the West Indies, and along with the first are much cultivated here for their fruit. *Artabotrys odoratissimus*, a climbing shrub, a native of Bengal, is grown in Bombay gardens for the sake of its fragrant green flowers.

Menispermaceæ.—Thirty-five species of this tropical order, or about one-third, are described as belonging to India, the remainder being found prin-

cipally in tropical Africa and America. Only nine occur in Bombay, all which are common to other parts of India. They are climbing shrubs, generally with heart-shaped leaves, small green flowers, and red fruit. *Tinospora Malabarica* and *T. cordifolia* are found throughout the South Konkan, but the latter is also distributed to Khándesh and the moister parts of Gujarát; it grows in the most luxuriant manner on Malabár Hill. *Anamirta cocculus*, the fruit of which is known as *Cocculus Indicus*, is a large climber with broad shining leaves and black fruit, very common in the South Konkan and in Kánara. *Cocculus macrocarpus* is a common Mátherán climber with sea-green leaves and bunches of white fruit resembling grapes. *C. villosus* abounds everywhere; it occurs in all the botanical provinces of Western India, and extends to tropical Africa. *Stephania hernandifolia*, found in the Konkan, is indigenous also to Africa and Australia. *Cissampelos Pareira*, a large Konkan climber, is said to occur not only in Africa, but in tropical America. *Cyclea Burmanni* is a Ghát climber, and *C. peltata* is universal throughout the Presidency. The plants of this order possess narcotic and tonic properties. The uses of *Cocculus Indicus* are familiar to most people. The root of *Tinospora cordifolia*, known as "galancha," is in common use here as a tonic and antiperiodic.

Nymphæaceæ.—Three species of this aquatic order, noted for its beautiful flowers, are found in Bombay. *Nymphæa lotus*, which closely resembles in appearance the British *N. alba*, the white Water Lily, is common in the larger tanks throughout the Presidency: it is found in Africa, Hungary, and other places; its large handsome flowers, appearing after the rains, vary in colour from red or rose to white. *N. stellata* is quite as common as the preceding, but its flowers are somewhat smaller, and are blue, white, rose, or purple. *Nelumbium speciosum* occurs throughout India, in Persia, China, Australia, and Africa; it is extinct in Egypt. Its flower is said to be the "Lotus" of Egyptian and Indian monuments, and its fruit the Pythagorean bean. In the Ajanta paintings the flower and leaf are frequently represented. The plant may be seen growing to perfection in a tank near the Thána Railway Station. It is easily distinguished from *Nymphæa* by its leaves being always raised above the surface of the water, while those of the other invariably float. The flowers are much larger and are white or rose-coloured; the fruit, about the size of a nut, is eaten, as are also the roots, in Sind.

Fumariaceæ.—Nearly all the Indian species of this order are natives of the Himálayás. Only one, *Fumaria parviflora*, is found in Bombay. It is a common weed in cultivated lands in the Deccan and Khándesh. The chief interest which attaches to it is due to the fact that it is also a British plant.

The Natural Order Papaveraceæ, closely allied to the preceding, is represented in Bombay by two naturalised species,—namely, *Papaver somniferum*, the opium poppy, cultivated in some districts of Khándesh and Gujarát, and *Argemone Mexicana*, a native of America, but now naturalised in India and diffused over the whole country. In many parts of the Deccan and Khándesh the latter plant is a perfect pest to the cultivators. It may be recognised by its bright yellow flowers and prickly thistle-like leaves.

Cruciferæ.—This large order chiefly inhabits temperate climates. Most of the Indian species are found in the Himálayás. One example only, *Cardamine hirsuta*, a small plant with yellow flowers, occurs in this Presidency—near Belgaum and in parts of Gujarát. Like the solitary species of the *Furmariaceæ*, it also is a British weed. *Raphanus sativus* the

Radish, *Lepidium sativum* the Cress, *Nasturtium officinale* the Watercress, with several varieties of *Brassica* the Cabbage, Turnip, and Cauliflower, are cultivated in many parts of the Presidency.

CAPPARIDEÆ.—The plants of this order are largely distributed to India, tropical Africa and America. It is important to note that a great proportion of the Indian species extend into tropical Africa—one of the many indications of the close botanical affinity existing between that country and India. About twenty species of the order are indigenous to Bombay, the majority of which are also African. *Cleome monophylla*, *C. viscosa*, *C. simplicifolia*, *C. Burmanni*, and *C. chelidonii* are all common annual weeds in the Deccan and Khándesh. The first grows also in Cutch, and *C. viscosa* is very abundant in the Konkan. *Gynandropsis pentaphylla* is found everywhere. *Mærua arenaria*, a climbing shrub with fruit shaped like a string of beads, is common in the drier parts of the Deccan, Khándesh, and Gujarát. *Cratæva religiosa*, a small tree with handsome white flowers, is distributed to the moister parts of Khándesh and Gujarát, and to the Konkan and Kánara. *Cadaba Indica* is a small shrub found in Gujarát and the Deccan. *Capparis*, a genus of thorny shrubs and climbers, gives eleven or twelve species to the Presidency flora. Of these *C. Heyneana*, *C. Moonii*, *C. Roxburghii*, *C. tenera*, and *C. horrida* are found principally on the Gháts and in the moister districts; the last is by far the most common. *C. pedunculosa* is very abundant in Khándesh and in the North Konkan. *C. Zeylanica*, *C. divaricata*, and *C. sepiaria* are plentiful in the Deccan. C. *spinosa*, a shrub, is common along the higher Gháts. A variety of this plant, found in the south of Europe, is the source of Capers. *C. grandis* is a small tree growing in the moister parts of the same district. *C. aphylla*, a thorny shrub with deciduous leaves and cherry-like fruit, is found only in the driest places in the Deccan, Khándesh, Gujarát, and Cutch. It is especially characteristic of the northern sandy localities of Gujarát, and is widely diffused over the arid districts of Persia, Arabia, and Africa.

VIOLACEÆ.—One species only, *Ionidium suffruticosum*, a small plant with red flowers, is known in Western India. It is common in the South Konkan and in the Belgaum hills, and spreads to Australia. Many other species of the order are found in Eastern India. The violet, *Viola odorata*, may be seen in gardens at Poona, Mátherán, and Mahábaleshvar.

BIXINEÆ.—The plants of this order are natives of the hot moist parts of India, Africa, and America. About one-third of the known species are distributed to India and the neighbouring tropical countries, many of them extending to the Eastern Islands and one or two to Africa. Seven species are known in Western India; they are all trees of small size, and are usually thorny. *Scolopia crenata* is found on the Southern Gháts and in Kánara. *Flacourtia montana*, *F. cataphracta*, *F. Ramontchi*, and *F. sepiaria* are very common on the Gháts; their fruits are generally eaten. The third extends to tropical Africa. *Hydnocarpus Wightiana*, bearing a large rugged woody fruit, is plentiful in the South Konkan; its seeds furnish an oil like Chaulmogra oil, which is much used in the treatment of leprosy. *Cochlospermum gossypium*, a member of a widely spread tropical genus, is a small tree with bright yellow flowers which appear before the leaves. It often occurs in the Deccan and Khándesh near villages; it is said, however, to be a doubtful native, but I have seen it unquestionably wild in the Eastern Khándesh hills. *Bixa Orellana*, from the seeds of which the red Anatto dye is prepared, is a native of Brazil, but is now a common shrub or small tree in Bombay and its neighbourhood. The cli-

mate here seems to agree with it so well that its cultivation, for the preparation of the dye, would doubtless prove a lucrative enterprise.

Pittosporeæ.—Two species of this small order are found along the Gháts and in Kánara,—*Pittosporum floribundum* and *P. dasycaulon*. They are both small trees, the former with yellow and the latter with white flowers. The plants of this order are almost entirely distributed to Australia.

Polygaleæ.—This is one of the most widely distributed natural families. There are 34 species found in India, five or six of which are indigenous to Bombay. *Polygala persicariæfolia* occurs on the Gháts and in the Deccan and is distributed to Africa and Australia; *P. erioptera* in Gujarát, and spreading to Arabia and Africa. *P. elongata* is found in Káthiáwár, the Konkan and Kánara. *P. chinensis* is common in Gujarát, the Deccan, and the Konkan, and extends also to Australia. *Salomonia ciliata*, a small annual like the four preceding species, is found throughout the Konkan. This order is chiefly remarkable for the wide range taken by its species.

Caryophylleæ.—Of this large order more than one hundred representatives are found in India; nearly all are natives of the temperate Himálayan regions, many of them, however, ranging widely into Northern Asia and Europe. Only three, all annual plants, are as yet known to belong to the Bombay flora :—*Saponaria vaccaria*, a weed of cultivation found all over India, is common in parts of the Konkan; *Arenaria Nilgerrensis*, a member of a large genus distributed to temperate and cold regions, occurs in the Southern Deccan; *Polycarpœa corymbosa* is found in Gujarát, Cutch, the Konkan, and the Deccan; it exists also in most other parts of India, and in Africa, Australia, and America. *Dianthus caryophyllus*, the Carnation or Clove Pink, a native of Europe, and a well-known ornament of our gardens in Bombay, belongs to this family.

Portulaceæ.—Two or three species of this small but widely diffused order are indigenous to all parts of the Presidency. One of them, *Portulaca oleracea*, is a cosmopolitan annual with fleshy leaves, eaten as a salad or pot-herb and cultivated or indigenous in most warm climates. *P. quadrifida* has yellow flowers, like the preceding, and is an equally common annual. *P. tuberosa* occurs in Cutch. Another member of the same genus, an American plant with showy variegated flowers, is now abundant in Bombay gardens.

Tamariscineæ is a small order commonly found in the hot arid regions of the northern hemisphere. *Tamarix ericoides*, a low shrub resembling a small Cypress, with heath-like flowers, inhabits the beds of the Gujarát, Konkan, Deccan, and Khándesh rivers. *T. dioica* is found in similar situations in Cutch and parts of Gujarát. Four or five additional species are indigenous to Sind and other districts of India. One of these, *T. gallica*, extends to the South of Europe and to Northern and tropical Africa.

Elatineæ.—Of this very small but widely distributed family three species are known in Western India. *Bergia odorata*, *B. ammannioides*, and *B. verticillata* are small plants, and uninteresting except for their very extensive range of distribution. The first is common in Gujarát and extends into Egypt and tropical Africa. The two latter are aquatic, growing in and near tanks throughout the Presidency; they have an equally extensive range, the second being found as far as Australia.

GUTTIFERÆ.—This exclusively tropical, moisture-loving, order is common in the warmest parts of Asia and America, but is rare in Africa. Between 60 and 70 species belong to India, eight of which are to be found in this Presidency. They are all trees with beautiful dark-green abundant foliage, and usually showy flowers. *Garcinia Indica*, well known here as Kokam, is a common tree in the sheltered Ghát and Konkan valleys from Khandála to Kánara. This most graceful of trees bears fruit the size of a small orange; from the seed the concrete oil called Kokam is obtained, and the acid rind is an indispensable ingredient of native curries. *G. Xanthochymus* and *G. ovalifolius* are both elegant trees common on the Southern Gháts and in Kánara. The gum-resin, Gamboge, is the produce of *G. Morella*, a native of Southern India and Ceylon. Many unsuccessful attempts have been made to cultivate in Bombay the Mangosteen, *G. mangostana*; nothing but a small stunted bush has been the result. *Ochrocarpus longifolius*, a handsome middle-sized tree, with white and red flowers, which are used for dyeing silk, is frequent in the Konkan and Kánara. *Calophyllum inophyllum*, a small crooked tree with shining foliage and showy white and yellow flowers, and *C. Wightianum*, which much resembles it, abound in the South Konkan and Kánara. *C. tomentosum*, a tall tree which yields one variety of Poon spars, is very common in the Kánara forests. The first mentioned species is widely distributed through Polynesia and extends to Madagascar and Mauritius. *Mesua ferrea*, found in the South Konkan, is a most beautiful tree with large, fragrant, pure white flowers; it is known in Bombay as "Nág Chámpa."

DIPTEROCARPEÆ.—An order of tropical Asia. Ninety-one species, more than half the whole number, are described as belonging to India, Burma, and Ceylon. They are mostly large resinous trees, some of them producing valuable timber. This Presidency boasts of but one representative, *Ancistrocladus Heyneanus*, a handsome scandent shrub with white flowers; it is found along the Gháts from Khandála southward. The absence of this order from Western India is somewhat remarkable; it is principally distributed to Eastern Bengal, Southern India, Ceylon, and Burma. *Shorea robusta*, the Sal, a valuable timber tree, also yielding one of the varieties of "dammar," is abundant in the Central Provinces, and is found close to the confines of Khándesh.

MALVACEÆ.—The plants of this large order are very abundant in all warm regions, and are comparatively common in temperate climates. About ninety species belong to India, more than one-third of these being indigenous in the Bombay Presidency. They vary in size from small herbs to lofty trees. One genus of the order, *Gossypium*, may perhaps be regarded as the most valuable to man of the whole vegetable kingdom. Among the species indigenous to Bombay are *Malva rotundifolia*, a small plant found in the Deccan near villages, and extending throughout India into Europe; five species of *Sida*, all of them small herbs with yellow flowers, are common in most places here and are distributed generally throughout the tropics of both hemispheres. Of *Abutilon* there are also five species, small shrubby plants with yellow flowers, found everywhere. *A. muticum* and *A. ramosum* occur in Gujarát and Káthiáwár; the former also in the Deccan where its seeds were much used as food by the poorer classes during the late period of famine. *A. Asiaticum* and *A. Indicum* furnish useful fibres. The latter extends to Africa and Australia. *A. striatum* is a common flowering shrub in gardens. *Malachra capitata*, a tall rough annual, a native of tropical America, now grows abundantly in waste ground in the neighbourhood of Bombay. A most valuable fibre, for which the plant is well worthy of cultivation, may be obtained from it. There

are two species of *Urena*, small plants with rose-coloured flowers, very common and distributed also to the tropics of Africa and America. *Pavonia Zeylanica*, belonging to a large South American genus, is found in Gujarát, and *Decaschistia trilobata* in the Konkan, on the Gháts, and in the Deccan; both are uninteresting shrubby plants. The first is widely spread throughout the tropics. *Hibiscus* is an important and widely diffused genus of about 150 species, extending to tropical Africa, America, Australia, and Polynesia. Nineteen or twenty species are indigenous to Western India, almost all of them being tall, rough, hairy annuals bearing large yellow flowers with a purple centre. *H. punctatus*, *H. intermedius*, *H. micranthus*, and *H. panduræformis* occur in Gujárát and Káthiáwár, the third also extending into the Deccan. The remaining species are found in the Konkan, on the Gháts, and in Kánara. *H. cannabinus* is cultivated as a pot-herb, while from its stems is procured the "ambádi" fibre. *H. sabdariffa* is the well-known Rozelle. *H. abelmoschus*, recognised by the musky odour of its seeds, is also cultivated. The fruit of *H. esculentus* is the familiar vegetable, Bhendi. This plant is not known in a wild state, but is, in all probability, originally a native of India. *H. tiliaceus* is a small tree with broad heart-shaped leaves and yellow flowers growing in the Konkan; it is also a common sea-coast tree of Australia and the Pacific Islands. A few years ago it was brought with some other plants from Sydney, whence its present frequency in Bombay gardens. *H. mutabilis*, *H. liliflorus*, *H. eriocarpus*, and *H. Rosa-sinensis*, the shoe-flower, shrubs with showy red or rose-coloured flowers, are abundant in gardens in all parts of the Presidency. *Thespesia lampas*, growing profusely on the Gháts, is a small shrub with large showy yellow flowers, appearing in the rainy season. *T. populnea*, the common Bhendi, seen everywhere, is a small tree bearing flowers similar to the last. Both these species are distributed to the Indian Archipelago and to tropical Africa, and the latter, in addition, to Australia. *Gossypium Stocksii*, the wild Cotton, is a straggling and sometimes, under certain circumstances, a climbing shrubby plant with small, deeply five to seven-lobed leaves, and yellow flowers an inch long, which gradually change to rose-colour before they wither; the cotton on the seeds is of a yellow hue. It is found truly wild in the Deccan, Khándesh, and Sind. There is hardly a doubt that this plant is the wild form of *G. herbaceum* and consequently the parent of the common kinds of Indian cultivated cotton. Some varieties of *G. Barbadense*, the parent of the American cottons known as Barbadoes, Sea-Island, Orleans, and Bourbon, have been experimentally cultivated in this Presidency. *Kydia calycina*, a tree with heart-shaped leaves and numerous white flowers, is common on the Gháts. *Bombax Malabaricum*, the Red silk-cotton tree, a lofty spreading tree with prickly trunk and large scarlet flowers, is common in all the forests of the Presidency from Gujarát and Khándesh to Kánara; it extends throughout most of the hot forest regions of India, and is also indigenous to Australia. *Eriodendron anfractuosum*, another large tree, similarly distributed in this country, and extending into Africa and tropical America, has small greenish white flowers; it is known as the White silk-cotton tree. *Adansonia digitata*, the Baobab, an extraordinary looking tree with an immensely thick trunk but a small head, occurs about villages in the Konkan and near the Mahomedan cities of the Deccan; it is a native of tropical Africa. *Althæa rosea*, the Hollyhock, a native of Europe, is a common ornamental plant of Bombay gardens.

STERCULIACEÆ.—This is a widely diffused tropical order, occurring abundantly in Asia and extending into Africa, Australia, and America. About ninety species are found in India, the Bombay flora possessing sixteen or eighteen of these. The largest and most important genus is *Sterculia*, many members of which are indigenous to tropical America. The

Bombay species are all large trees, common in the moist forest districts. *S. fœtida*, a tall erect tree, occurs in the Kánara forests, but does not appear to be indigenous north of that province; it yields one variety of Poon spar. This tree is common in the Eastern Archipelago. *S. urens*, a large spreading crooked tree with white papery bark, abounds on the Northern Gháts, in the Dáng, and in the Khándesh and Gujarát forests; it yields a large quantity of gum resembling tragacanth. *S. villosa* and *S. guttata* are abundant on the Southern Gháts and in Kánara; from the bark of the latter, cloth is made in Malabár. *S. colorata*, a tall tree with red flowers, is common in the Gujarát and Khándesh forests and on the eastern slopes of the Gháts. *S. alata*, another lofty tree, occurs in Kánara. *Kleinhovia hospita* is a small straight tree with rose-coloured flowers found in the Konkan. *Helicteres isora*, a widely distributed shrub or small tree with red flowers and curiously twisted cylindrical fruit, is common in the Gujarát forests and in the Deccan; it extends to the Indian Archipelago and to Australia. A useful fibre may be obtained from its bark. *Pterospermum acerifolium*, a low much-branched tree with splendid foliage, large white fragrant flowers, and woody fruit shaped like a small cocoanut, is common in the Konkan near Bombay; it is doubtful, however, whether the tree is really indigenous. *P. Heyneanum*, a species somewhat resembling the first in appearance, grows on the Gháts towards the south and in the Southern Marátha Country. *P. suberifolium*, smaller than either, has very fragrant white flowers and is abundant in the Konkan jungles. *Eriolæna Candollei* is a common tree on the Gháts, and *Melochia velutina*, a fast-growing tree with a profusion of small pink flowers, abounds everywhere. *M. corchorifolia* and *Waltheria Indica* are two widely diffused tropical weeds; in this Presidency they extend from Gujarát to Kánara. *Buettnaria herbacea* is a common Bombay weed. A few specimens of *Guazuma tomentosa*, a native of tropical America and a small but elegant fast-growing tree with handsome foliage, may be seen in Bombay and its vicinity. In South India it is extensively planted. The most important member of this order, *Theobroma cacao*, the Cocoa tree, a native of tropical America, was formerly to be found in many Bombay gardens. It now, however, appears to have become extinct on this side of India.

Tiliaceæ.—The species of this order are abundant in the tropics both of the Old and New Worlds, and comparatively so in temperate regions. About one-third belong to the Flora Indica, and of these nearly thirty are to be found in Bombay. Many plants of the order produce valuable fibres, others yield pleasant fruits. *Grewia* is a large and very widely diffused genus of trees and shrubs, of which about fourteen species, bearing white or yellow flowers, are found in Western India, principally in the Deccan and on the Gháts. *G. orientalis* is a common shrub on the Southern Gháts; it extends to Australia. *G. populifolia*, *G. orbiculata*, *G. Ritchiei*, *G. polygama*, and *G. Microcos* are all Konkan shrubs. *G. tiliæfolia* is a common tree in Bombay. *G. Asiatica*, a small tree with yellow flowers and edible fruit, is cultivated everywhere, and is found wild in the Deccan. Both the last-mentioned species are also indigenous to Africa. *G. pilosa* and *G. villosa* are also found in the Deccan. *G. carpinifolia* and *G abutilifolia*, both small trees, occur in the Deccan and in the Konkan. Fibres may be procured from the bark of all the members of this genus. *Erinocarpus Nimmoanus* is a small tree very abundant on the Gháts opposite Bombay; it bears showy yellow flowers and winged prickly fruit. *Triumfetta pilosa*, *T. rhomboidea*, and *T. rotundifolia* are common weeds everywhere south of Gujarát; the two first extend into tropical Africa. *Corchorus* is an important and widely spread genus. *C. capsularis* and *C. olitorius*, from both of which Jute is obtained in Bengal, grow abundantly in the Konkan and in the moister parts of the Deccan. In the vicinity

of Bombay they will reach a height of eight feet in sheltered situations on good soil, and will yield excellent fibre. *C. trilocularis*, *C. fascicularis*, and *C. antichorus* are found in the drier parts of the Presidency. *C. acutangulus* is a common Konkan weed. *Elæocarpus ganitrus*, a small tree of the Konkan and Gháts, bears purple fruit, the rough stone of which is used by religious mendicants for their necklaces. *E. oblongus* and *E. tuberculatus* are small trees found on the higher Gháts to the south. This is a large genus, abundant in India and the neighbouring islands; a few of its species occur in Australia.

LINEÆ.—Of this, the Flax order, the greater number of species are natives of the South of Europe; several are, however, included in the Indian flora. *Linum Mysorense* is a common annual about Bombay and in the Deccan. It is doubtful whether the Flax, *L. usitatissimum*, is indigenous to Western India, but it is extensively cultivated for its seed in Gujarát, Khándesh, and the Deccan. *Reinwardtia trigyna* and *R. tetragyna*, small shrubby plants bearing showy yellow flowers, are common in Bombay gardens, but are found wild on the Gháts. *Hugonia mystax*, a shrub with flowers like the last, occurs in the South Konkan and Kánara. Other members of the genus are natives of Western Africa.

MALPIGHIACEÆ.—This is a large tropical American order having but few Asiatic representatives. Only four species, all woody climbers, are known in Western India. *Hiptage Madablota* is common in the Konkan and Ghát jungles; it bears showy white and yellow flowers, which appear in the cold season, and winged fruit. *Aspidopterys cordata*, *A. Roxburghiana*, and *A. Canarensis* are smaller climbers than the last, found in the Konkan, and Kánara jungles. A native of the West Indies, *Malpighia coccifera*, is a frequent shrub in gardens; it resembles a miniature Holly. One species of *Galphimia*, a Mexican genus, and *Stigmaphyllon ciliatum*, another West Indian plant, are common climbers here; both have bright yellow flowers.

ZYGOPHYLLEÆ.—A small tropical and sub-tropical order, widely diffused throughout warm regions, especially of Northern Africa But two species are found in this Presidency, both inhabiting the drier districts. *Tribulus terrestris*, a small annual with yellow flowers and prickly three-angled fruit, is plentiful in the Deccan, Gujarát, and Káthiáwár; it extends into Australia, Arabia, Egypt, and tropical Africa. *Fagonia Arabica*, a shrubby spinous plant, occurs in similar localities.

GERANIACEÆ inhabit the temperate, and to a less degree the tropical regions of both worlds. Some of the genera are confined to the northern, others to the southern hemisphere; a few may be termed cosmopolitan. About one-fifth of the order is included in the India flora, a large proportion of these being common to Europe and North Africa. The order is but scantily represented in this part of India. *Monsonia senegalensis*, a common weed with pink flowers, found in the Deccan, extends to Arabia, to North-Western India, and to portions of Southern Africa. *Oxalis corniculata*, a small spreading plant with yellow flowers, is common everywhere in cultivated land: it is the pest of Bombay gardens, and is also found in Europe, Africa, and Australia. *O. Acetosella*, the Wood-sorrel of England, although not found in Western India, may still be mentioned here as indigenous in all the temperate Himálayan regions. Another species with rose-coloured flowers may be seen in gardens, and is rapidly becoming a weed. *Biophytum sensitivum*, a common Konkan weed, extends throughout tropical Asia, Africa, and America. *Averrhoa carambola* and *A. bilimbi*, both small trees, are cultivated here for their acid fruit. Their native country is unknown. The large genus *Impatiens* has several re-

presentatives in the flora of this Presidency. They are all annual plants with showy flowers, and appear only during the rainy season. The common garden Balsam is a cultivated variety of *I. balsamina*, a very variable plant and one of the commonest Bombay weeds, springing up everywhere at the first rainfall. The varying hue of the flowers in the wild species is no doubt due in many cases to their descent from a cultivated plant. After a couple of generations in its original habitat the best double variety will become single and take on the form of the wild parent plant. The remaining species are found in the Konkan and Kánara. A considerable proportion of the genus is distributed to the mountainous districts of Southern India. The cultivated varieties of *Pelargonium* and *Tropæolum*, so common in Bombay gardens, and so well known, belong to this order.

RUTACEÆ.—The Bombay species of this important natural family will be most conveniently mentioned under the sub-orders in which they are classed. The solitary indigenous member of the sub-order *Ruteæ* is *Peganum harmala*, a small plant with white flowers, occurring in the Deccan; it is supposed by some to have been introduced there by the Mahomedans. It occurs, too, in other parts of India and extends into the South of Europe. Although various species of the sub-order are found in this country, the main portion of it is distributed to Southern Europe, Africa, and Australia. *Ruta graveolens*, the evil-smelling Rue, is occasionally seen in Bombay gardens. The small sub-orders *Zanthoxyleæ* and *Toddalieæ* have several Indian representatives; but they are, however, chiefly distributed to tropical America and Australia. Only four species, all trees, are known in Western India. *Zanthoxylon rhetsa*, a prickly tree bearing small fruit which tastes like orange rind, and the seeds somewhat like black pepper, is found along the Gháts from Khandála to Kánara. *Evodia Roxburghiana*, a tree without prickles, with trifoliate leaves and white flowers, occurs in the same localities. *Toddalia aculeata* is a small prickly tree whose seeds also taste like black pepper; it grows along the Gháts and is abundant in Kánara. *Acronychia laurifolia*, a shrub with fragrant yellowish white flowers, occurs also on the Gháts. The small but important sub-order *Aurantieæ* is almost entirely Indian. Fourteen or fifteen species are indigenous to this Presidency. *Glycosmis pentaphylla*, a small shrub with white flowers, is common in the Konkan; it is a very variable plant, as its numerous synonyms show. It extends to Australia. *Murraya exotica*, also Australian, and *M. Kœnigii*, small trees with fragrant white flowers, are found on the Gháts. The first is often cultivated as an ornamental plant in gardens and the latter bears an edible fruit. *Clausena Indica* and *C. Willdenovii*, both shrubs, occur on the Southern Gháts. *Triphasia trifoliata* a low thorny shrub with small crimson fruit, is said to be indigenous; this it almost certainly is not, being invariably seen here in gardens only and never wild. It is probably a Chinese plant. *Atalantia monophylla*, a climbing thorny shrub with delightfully fragrant white flowers, is common on the Gháts; it is especially abundant at Mátherán. *A. racemosa*, which much resembles it, together with *Luvunga eleutherandra* and *Parámignya monophylla*, also thorny climbers, are found in the same localities. *Limonia acidissima*, another thorny shrub, occurs on the Southern Gháts. *Feronia elephantum*, the Woodapple, a large spreading tree with leaves smelling of anise, and bearing a rough woody fruit the size and shape of a cricket ball, is very common in Khándesh and Gujarát. *Ægle marmelos* is a thorny tree with trifoliate leaves, and hard fruit resembling an orange in appearance; this is the well-known Bel fruit. The tree is found sparingly throughout the Konkan and Kánara, but is most abundant in the forests of Khándesh and Eastern Gujarát. The cultivated species of *Citrus* are to

be found in most parts of the Presidency, but principally in Bombay and the Deccan. The wild species from which they are derived are indigenous to Northern India, one or two of them to the Malayan Islands. *C. medica*, var. *medica*, is the Citron, var. *Limonum* of the same species is the Lemon, var. *acida* the Sour Lime, and var. *Limetta* the Sweet Lime. *C. aurantium*, var. *aurantium* is the common Sweet Orange, var. *Bigaradia* the Bitter or Seville Orange, and var. *Bergantia* the Bergamotte Orange. *C. decumana* is the common Pumelo or Shaddock.

SIMARUBEÆ.—This order, characterised by the possession of an intensely bitter principle, is distributed throughout most tropical regions, but chiefly to America, Africa, and the Indian Archipelago. The Bombay flora contains four or five species. *Ailantus excelsa*, a large tree with white bark, is comparatively frequent in Khándesh, but is very common in Gujarát. The bark possesses bitter antiperiodic properties. *A. Malabarica* is common in Kánara. *Samadera Indica*, a small tree, is found in the same district. *Balanites Roxburghii* is a low thorny tree growing in Gujarát, Khándesh, and the Deccan. It occurs also in tropical Africa. *Quassia amara*, a native of Guiana, has lately been introduced into Bombay. This shrub is said to be the original source of the bitter drug, Quassia.

OCHNACEÆ.—A small order found chiefly in tropical America, Asia, and South Africa. Some of the Indian genera have representatives in Arabia. *Ochna pumila* is the sole species indigenous to Western India; it is a small shrub, with bright yellow flowers, found growing in the South Konkan. *O. squarrosa*, a native of Eastern Bengal, is a common shrub in Bombay gardens.

BURSERACEÆ.—This small but very important family of resinous trees and shrubs is distributed to India, Arabia, Malacca, Eastern Africa, and tropical America. The different kinds of Olibanum, Bdellium, Myrrh, the Balm of Gilead, and other fragrant resins are yielded by plants of this order. Many of its species are as yet imperfectly known. The most interesting genus is *Boswellia*. *B. serrata*, the "Salai" of Central India, is the source of Indian olibanum, the true "gugal" of Sanskrit writers. It is a small crooked tree with whitish bark which separates in papery layers; it bears pinnate leaves and spikes of small pinkish-white flowers at the ends of the branches; the whole tree has a balsamic odour. It is very common on the Sátpuda and Khándesh hills and in Eastern Gujarát, especially in the Lunáváda districts; but so far as I am aware it does not extend further south, in Western India at least, than the range of hills which forms the boundary between the Khándesh and Násik districts. In parts of Central India the tree is very abundant. The numerous varieties of frankincense and olibanum which are brought to Bombay from Aden are obtained from Arabian and African species of this genus. Three of these, introduced by Colonel Playfair, formerly Political Resident at Zanzibar, were described and named by Dr. Birdwood; they are still to be seen in the Victoria Gardens struggling to exist in this moist climate, so different from that of their native country—arid Eastern Africa. It is doubtful whether *Balsamodendron mukul*, from which the common or "byssa gugal" of the Bombay bázár is obtained, is indigenous in any part of the Presidency except Cutch. Much of the "gugal" sold in Bombay is brought from the latter province. Several specimens of another member of this genus, described under the name of *B. Roxburghii*, are planted round a Hindu temple near the village of Peth in the Poona district, but where they were brought from cannot be discovered; it is said to occur wild in other districts of the Deccan and in Northern Khándesh, but if so it must be exceedingly rare,—I at least have never succeeded in finding it. It was for long suspected to be identical with the first mentioned species, but a

recent comparison would seem to point to the conclusion that it is a distinct species, or at least a well-marked variety. Further research on this vexed question is necessary. The fragrant resins, Myrrh and Balm of Gilead, are the produce of Arabian shrubs of this genus. *Garruga pinnata*, a tree with yellowish-white flowers and edible fruit, is found in all the moister parts of Western India—cultivated no doubt in many cases. *Canarium strictum* is a tall tree with large leaves occurring along the Southern Ghâts and in Kánara, as well as in the forest districts of Eastern Gujarát. It produces an aromatic yellow or brownish-yellow resin known as black dammar. Many other species of this imperfectly studied genus are indigenous to the Indian Archipelago and the neighbouring mainland. A few ill-grown specimens of *Filicium decipiens*, a tall tree of Southern India and Ceylon, are to be seen in Bombay gardens.

The small but important order MELIACEÆ consists of trees and shrubs, and is distributed to most parts of the tropics. About fifteen species are indigenous to Western India. *Turræa virens* and *Naregamia alata* are common Ghát shrubs. *Melia azadirachta*, the well-known Nim, is found in every district of India; on this side the tree reaches its greatest development in Gujarát. It is cultivated in many other parts of the world. *M. dubia* is a small Ghát tree. *M. azedarach*, the Persian Lilac, a native of Northern India and of Persia, is a common cultivated fast-growing tree in Bombay *Cipadessa fruticosa* is a shrub found on the Gháts and Deccan hills. *Amoora cucullata* and *A. Lawii* are Ghát trees; other members of the genus extend to Australia. *Walsura piscidia* also occurs on the Gháts. The bark of this tree is used to poison fish *Heynea trijuga* is a small tree very common along the Gháts and in Kánara. *Soymida febrifuga*, a large and valuable timber tree, grows in the Khándesh and Gujarát forests; its bark possesses a bitter antiperiodic principle. *Chickrassia tabularis*, another useful timber tree, is found in the South Konkan and Kánara. *Cedrela toona*, a large tree, yields a valuable wood resembling mahogany. It also is found in the same localities as the last and on the eastern slopes of the Gháts. It extends to Australia. *Chloroxylon Swietenia* is the Satin-wood; it is a small tree in this Presidency, but attains a large size in Ceylon and Southern India. It grows in the Ahmednagar district and about Belgaum and Gokák. This order produces a number of choice timber trees. Mahogany is the wood of *Swietenia mahogoni*, a native of Central America, and now to be seen about Bombay. In Madras and Bengal some trees have already reached a considerable size. Many species of *Meliaceæ* possess in addition tonic and antiperiodic properties.

CHAILLETIACEÆ.—A small order of tropical trees and shrubs with one representative in Western India. *Chailletia gelonioides*, a member of a widely spread genus, is a small tree found on the Gháts; it bears a fruit like a nutmeg, which is furnished with a similar red arillus.

OLACINEÆ is another small tropical family of which three or four species belong to the Bombay flora. The remainder are widely diffused throughout the tropics, a large proportion of them being indigenous to India. *Olax Wightiana*, a climbing shrub with white flowers, *Mappia oblonga*, a small tree bearing fœtid yellowish-white flowers and purple fruit, and *Sarcostigma Kleinii*, a climbing shrub with bunches of orange-coloured fruit, are found on the Southern Gháts. The first genus is distributed also to Africa and Australia, and the second has some tropical American representatives.

ILICINEÆ.—*Ilex Malabarica* is the only member of this order known in the Bombay Presidency. It is a tree with shining leaves, small white flowers, and red berries, found growing on the Gháts. The order is distributed to Asia, South America, and South Africa. Several species occur in the Himálayás. The British Holly is *I. aquifolium*.

CELASTRINEÆ.—A widely diffused order found in most of the warmer parts of the globe. They are all trees or shrubs, often thorny. A considerable number of species are natives of India. *Euonymus Indicus* and *Pleurostylia Wightii* are shrubs found on the Gháts. *Lophopetalum Wightianum*, a small tree, occurs in Kánara. *Celastrus paniculata* and *Gymnosporia Rothiana* are common Ghát and Konkan shrubs. *G. montana*, a variable species, grows very abundantly as a thorny shrub in the drier parts of the Deccan, Khándesh, Gujarát, and Káthiáwár; it is distributed to Sind, Central Africa, the Indian Archipelago, and Australia. A small tree with yellow flowers, *Elæodendron glaucum*, is found on the Gháts and in the moister parts of the Deccan hills. *Hippocratea Indica* and *H. Grahami*, climbing shrubs, are among the commonest of Ghát plants. Four or five species of *Salacia*, a widely diffused tropical genus, all shrubs, are found on the Southern Gháts and in the neighbouring parts of the Konkan. *S. prinoides* bears a cherry-like eatable fruit. Many plants of the order possess stimulant, emetic, and purgative properties.

RHAMNEÆ.—These inhabit the temperate and tropical regions of every part of the world. Some of the genera are localised to particular countries, while others are extensively diffused. They are found in most parts of India, both in the mountainous districts and in the plains. About twelve species are natives of this Presidency. *Ventilago madraspatana* and *V. Bombaiensis*, both climbing shrubs with green flowers, grow on the Gháts. The first is common, too, in Gujarát and extends to tropical Africa. *Zizyphus* is a large genus of thorny shrubs and trees scattered through many parts of the tropics. *Z. jujuba* is an exceedingly common tree in Western India and spreads to Australia and Africa; in Gujarát and Khándesh it is cultivated for its fruit. It is noted for the very fœtid smell of its small green flowers. *Z. xylopyrus* much resembles the last in appearance; it is common on the Gháts and in the Konkan. *Z. rugosa* and *Z. œnoplia*, both thorny climbers, abound in the Konkan, Ghát, and Deccan jungles; the former yields an edible fruit. *Z. nummularia*, a spreading shrub with hooked thorns, is found in the drier parts of the Presidency, and is especially plentiful in Khándesh and Gujarát, where it is much used for making fences. *Rhamnus Wightii*, the sole Bombay representative of a large widely spread genus, which extends to Great Britain, is a shrub found on the higher Gháts north of Bombay and in parts of the Deccan; its bark is used as a tonic. *Scutia Indica* is a very common thorny shrub at Mahábaleshvar. *Colubrina Asiatica*, a shrub with shining foliage and greenish-yellow flowers, abounds in the Konkan and on the Gháts. This genus is chiefly American, but our indigenous species is widely spread throughout the whole of the Old World tropics. *Gouania leptostachya*, a climber, occurs in the South Konkan. Green and yellow dyes are yielded by some plants of this order, while others produce agreeable fruits. Many possess a bitter purgative principle.

AMPELIDEÆ.—The Vine order. Its species abound in the tropics of Asia and Africa, but are more rare in those of America and in temperate climates. The cultivated Vine, *Vitis vinifera*, is supposed to be a native of Georgia and Mingrelia, and also of the Northern Himálayás. In this Presidency it is grown at Poona and in parts of Khándesh. The genus *Vitis* contains about 230 species, spread over the tropics of both worlds. Between 70 and 80 are natives of India, in every part of which they are found. A great number, too, are indigenous to Africa. Sixteen or seventeen occur in Western India; these are all climbing plants with tendrils, small greenish flowers, and black, red, or white berries; they are common in all the moister parts of the Presidency, particularly near the sea. *V. quadrangularis*, a strange looking plant, often mistaken for a *Cactus*, is found in Gujarát and along the coast; it may be recognised by its thick, fleshy,

square stems, and small leaves. The species commonest in the Deccan are *V. glauca*, *V. setosa*, and *V. pedata*. *V. discolor*, a very handsome species, known by its deep green and purple, velvetty leaves, is found in the shady Konkan ravines. *V. adnata*, *V. Indica* and *V. Rheedei* are the most frequent about Bombay. The remaining species occur chiefly in the Konkan and Kánara and along the Gháts. *Leea sambucina*, also an African and Australian species, is a handsome fast-growing shrub common in the Ghát and Konkan jungles. *L. macrophylla* occurs on the Konkan hills.

SAPINDACEÆ.—This large order is abundant in tropical regions, some of its genera being very widely diffused. Two or three of the Hymálayan genera spread as far as Great Britain, one of them to North America; several others, natives of the warmer districts, extend to Australia. A considerable number of species are indigenous to India, but of these hardly more than ten are to be found on this side. *Cardiospermum halicacabum*, a cosmopolitan tropical plant, is a common annual climber in the Konkan and other parts of the Presidency. It springs up everywhere during the rains and may be known by its small pinkish-white flowers, bladdery capsules, and black seeds which bear a white heart-shaped spot. The genus is principally American. *Hemigyrosa canescens*, a tree with small white flowers, occurs on the Gháts. *Alophylus Cobbe* is a very variable species; consequently it is burdened with synonyms. According to soil and situation it is a small tree, a shrub, or a woody climber. It is found in the South Konkan, but is diffused also through the other moist parts of India, the Indian Archipelago, and Northern Australia; the genus has several American representatives. *Schleichera trijuga* is a common Ghát tree occurring also in the Gujarát, Khándesh, and Kánara forests; it bears white flowers and prickly fruit, and is said to yield valuable timber. *Sapindus emarginatus* is a large tree common about villages in the Deccan and Khándesh; it is, however, a doubtful native. *S. laurifolius*, a tree somewhat resembling the last, is to be found in all parts of the Presidency, where it appears to be truly wild. The three-lobed fruit of both trees is used as soap. By some these two are regarded as varieties of one species, namely, *S. trifoliatus*. The very marked difference, however, which is exhibited in general appearance and habit, and in the shape of the leaves, well seen when the trees grow near each other, renders it difficult to believe that they are not distinct species. The genus is diffused through all tropical countries. *Nephelium Longana*, a useful timber tree bearing edible cherry-like fruit, occurs on the Gháts and in Kánara. The Litchi fruit is the produce of *N. Lit-chi*, a Chinese tree sometimes found in Bombay gardens. *Dodonæa viscosa*, a shrub with clammy leaves and white flowers, is common on the Gháts and in the Southern Marátha Country. The genus is chiefly Australian, but our indigenous species is cosmopolitan in the tropics. *Turpinia pomifera* is a small tree found on the Gháts to the south; it spreads to all the moister parts of India. Some plants of this order are remarkable for the possession of a saponaceous principle, others are stimulant and aromatic, and a few produce esteemed fruits.

ANACARDIACEÆ.—No more than seven species, representing six genera, of this important and comparatively large tropical family, are indigenous on this side of India. They are, however, more abundant in the southern parts of the country. A large proportion of the order exists in tropical Africa and America, and one genus, *Rhus*, is found in North America, India, China, Australia, and South Africa. *Mangifera Indica*, the Mango, is too well known to need description. In this Presidency it attains its greatest size in the Deccan and Khándesh. The finest specimens are to be seen at Násik. In some parts of Khándesh these splendid trees give to the landscape quite a park-like appearance. Many varieties are cultivated for their fruit; the best and most esteemed of these being found along the

western coast. They have of late years been introduced into Queensland, where, judging by accounts recently received from thence, they appear to have become thoroughly acclimatised. In the West Indies and Mauritius the cultivated mango has long been known. *Buchanania latifolia*, a handsome forest tree with fragrant flowers and edible seeds, is found in all the forest districts, especially in Kánara, Khándesh, and Gujarát. *Odina Wodier*, a large tree with white bark and spikes of small purple flowers, grows in almost every part of the Presidency. *Semecarpus anacardium*, the Marking-nut tree, is found in the Deccan, the Konkan, Kánara, and Gujarát; its seeds are edible, and the acrid juice of its fruit is used for marking linen and as a vesicant. The tree is also indigenous to Australia. *Holigarna Arnottiana* is a useful timber tree found in Kánara; a fine black varnish is procured from its fruit. *H. Grahamii* occurs in the Konkan. *Nothopegia Colebrookiana* is a small tree growing on the Gháts and in the South Konkan. It bears white flowers and edible fruit. All the plants of this order yield an acrid resinous juice, which in some cases is a violent irritant poison. *Pistacia terebinthus*, the Chian turpentine tree, a native of Southern Europe, has lately been introduced into Bombay, where it seems to flourish exceedingly. *P. vera*, a Persian tree, yields Pistachio nuts. Cashew nuts are the produce of *Anacardium occidentale*, a Brazilian tree, now common in many parts of the Konkan, and no doubt introduced by the Portuguese. *Schinus molle*, the false Pepper, a small tree of tropical America, may be seen in Ganesh Khind Gardens. *Spondias mangifera*, a tree indigenous to many of the forest districts of other parts of India, has become pretty common about Bombay; its fruit is eaten.

Moringeæ.—This order consists of but three species, two of which are indigenous to Western India and the third to Arabia and Eastern Africa. *Moringa pterygosperma*, known to Europeans in India as the Horse-radish tree, is found wild in Khándesh—in the forests along the base of the Sátpuda range. In most parts of the Presidency it is planted near villages. Another species, *M. Concanensis*, occurs in the Konkan and in Sind; it has yellow flowers and larger leaves than the first, and may possibly be only a variety of *M. aptera*, which is found in Arabia, Egypt, and Eastern Africa. The two Indian species of this order possess in abundance the acrid pungent principle so characteristic of the *Cruciferæ*. The root, scraped, of *M. pterygosperma* is always used in India as a substitute for Horse-radish, while its juice is occasionally employed as a vesicant. Ben oil, used by watchmakers, is said to be obtained from the seeds of *M. aptera*, and a similar oil may be expressed from those of *M. pterygosperma*. The latter tree yields a large quantity of gum, which is collected extensively by the Khándesh Bhils.

Connaraceæ.—A small order of trees and shrubs distributed to the tropics of Asia, Africa, and America. The two genera represented in the Bombay flora are common to all. Several species are found in other parts of India. *Rourea santaloides*, a climbing shrub with stiff shining leaves, occurs on the Southern Gháts; it extends also to Western Africa. *Connarus monocarpus*, a shrub with small yellowish-white flowers, leaves similar to the last, and long bright red fruit, together with *C. Wightii* and *C. Ritchiei*, is found in the same localities. The order is chiefly valuable for the ornamental wood yielded by some of its species. Oil is procured from the seeds of others.

Leguminosæ.—This great family, containing upwards of 7,000 species, is probably the most important of the vegetable kingdom:—whether we consider its numbers, variety of form, extensive distribution, or its manifold uses as food, in medicine, or in the arts. The order derives its name from the peculiar form of its fruit, by which character it may always be

recognised. Differences in the form of its flowers cause it to separate naturally into three sub-orders, *viz.*, *Papilionaceæ*, *Cæsalpinieæ*, and *Mimoseæ*. A familiar representative of the first would be *Erythrina Indica*, of the second *Cassia fistula*, and of the third *Acacia Arabica*. *Papilionaceæ* are diffused over the greater part of the world, but are most abundant in warm regions and in the north temperate zone. *Cæsalpinieæ* are almost entirely confined to tropical regions, while *Mimoseæ* are pretty generally diffused throughout the tropics and the south temperate zone, being very rare in the sub-tropical parts of the northern hemisphere. There are 290 genera described as belonging to the first sub-order, 76 to the second, and 27 to the third. In Western India they occur in almost exactly the same relative proportions, while as regards distribution, *Papilionaceæ* are pretty equably spread over the whole Presidency; with few exceptions *Cæsalpinieæ* are found most constantly in the Konkan, on the Gháts, and in Kánara; and *Mimoseæ* are best represented in the drier districts of the Deccan, Khándesh, and Gujarát. The Bombay flora possesses nearly twice as many specific representatives of *Leguminosæ* as it does of any other natural family, while at the same time a large number of the species are extremely rich in individuals. At least 220 species are found on this side of India, a rather meagre proportion when it is remembered that the order contains altogether more than 7,000. Within the limits of the present paper it will be impossible to do more than merely allude to the greater number; a fuller notice will be taken in those cases only where the plants appear to possess qualities of sufficient interest.

Belonging to *Papilionaceæ*, the first sub-order, we have *Rothia trifoliata*, a small annual plant found sparingly in the Konkan. *Heylandia latebrosa*, the only member of the genus, is a spreading prostrate herb, exceedingly abundant in the Deccan. *Crotalaria* is a large tropical, principally African, genus of herbaceous plants, usually bearing showy yellow or purple flowers. The most important member of it, *C. juncea*, is extensively cultivated for its fibre, well known as *San*. *C. Burhia* and *C. Notonii* are found in the drier parts of Gujarát and Káthiáwár, and the remaining indigenous species, fully 30 in number, in the Konkan and on the Gháts; several also occur in the Deccan. *Indigofera*, a second great tropical genus of annual plants, has at least 20 representatives in the Bombay flora. Most of these are found in the Konkan and a few spread into other districts of the Presidency. *I. linifolia*, *I. cordifolia*, and *I. glandulosa* abound in the Deccan, where their seeds prove valuable articles of food in seasons of scarcity. *I. tinctoria*, the plant from which indigo is obtained, grows wild in the Konkan. None of the remaining Bombay species possess any particular interest. Members of this genus, including several of our indigenous species, are especially numerous in tropical and Southern Africa. *Psoralia corylifolia*, an annual weed, abounds everywhere. *Millettia racemosa*, the single indigenous species, is a climbing shrub with large rose-coloured flowers, found near Belgaum and in the Dáng forests. Numerous species of the genus occur in other parts of India. *Mundulea suberosa*, a small tree, also bearing rose-coloured flowers, grows in the former locality; it extends into Eastern Africa. In this country its seeds are said to be employed for poisoning fish. Of the large genus *Tephrosia*, three species, shrubby or herbaceous plants, are common in the Konkan. One of these, *T. purpurea*, a cosmopolitan tropical plant, is plentiful also in Gujarát and Cutch. *Sesbania aculeata* and *S. procumbens*, members of a very widely diffused tropical genus, are annual plants growing in great abundance near marshy ground in the Konkan; the first is plentiful also in the moister parts of the Deccan, Khándesh, and Gujarát; it spreads to Australia and Africa. *S. Ægyptiaca* and *S. grandiflora*, fast-growing trees, probably not indigenous however, are common near Bombay. The latter bears beauti-

ful large white flowers, and its pods are eaten as a vegetable. Both trees appear to be natives of the Indian Archipelago. *Taverniera nummularia* is a small Deccan and Káthiáwár shrub; it is widely distributed over the drier parts of Asia. *Geissapsis cristata* and one or two species of *Zornia* are minute annuals abundant in Deccan pastures; both genera are broadly dispersed, the first to tropical Africa, and the second to the Cape, Australia, and America. *Z. diphylla* is cosmopolitan in the tropics. *Alhagi maurorum*, the Camel thorn, is very common in the driest parts of Gujarát. It occurs in all the arid sandy regions of India, Arabia, Syria, and Egypt, also in the south of Europe. Seven or eight species of *Smithia* are found on the Southern Gháts and in the adjoining parts of the Deccan; they are small herbaceous plants of no particular importance. *S. sensitiva* is exceedingly abundant in the Konkan. *Æschynomene Indica*, an annual weed with yellow flowers, occurs in the Konkan and Gujarát; it is dispersed throughout the tropics of the Old World. *A. aspera*, a native of Bengal, furnishes the substance of which the common pith hats are made. *Pycnospora hedysaroides*, a small plant of the South Konkan, extends to China and Australia. *Pseudarthria viscida* and *Uraria picta* are also two small perennials of the South Konkan. Seven or eight species of *Alysicarpus*, all herbaceous plants, are common in the Konkan and the Deccan, the most abundant being *A. rugosus* and its varieties. The genus is represented, and by some of our Bombay species, both in Africa and Australia. Two or three extend to the Deccan. The solitary member of the genus *Ougeinia*, *O. dalbergioides*, is a large tree yielding a valued and durable timber. It bears a multitude of small pinkish white flowers and is common in the Dáng, Sátpuda, and Gujarát forests; it also occurs in Kánara. Several members of *Desmodium*, a large cosmopolitan genus of herbs and shrubby plants, scattered chiefly throughout the tropics, are found in the Konkan; numerous other species occur in various parts of India. *Abrus precatorius*, a well-known climbing shrub, easily recognised by its bright scarlet seeds, may be seen in all parts of the Presidency; its root is said to be used as a substitute for liquorice, but to this drug it has not, as far as my experience goes, the faintest resemblance. One variety of the plant has white seeds. The genus, and especially our indigenous species, is very extensively distributed through the tropics. *Cicer arietinum* is the common Gram or Chick-pea, and is cultivated in various temperate and tropical countries. *Shuteria vestita*, *Glycine pentaphylla*, and *Teramnus labialis*, members of small cosmopolitan tropical genera, are Konkan climbers. *Mucuna monosperma* and *M. pruriens* belong to a widely spread tropical genus of large climbing plants. Both species are abundant in all the moister districts of the Presidency; the latter is cosmopolitan in the tropics. They have dark purple, nearly black, flowers; the first bears a short thick pod, that of the second being curved like the italic letter *f*. The pods of both plants are covered with loose hairs, which come off at the slightest touch and produce the most intense irritation if allowed to fasten themselves to the skin. *Erythrina Indica*, a well-known tree of rapid growth, with a profusion of brilliant scarlet flowers which appear in January, is plentiful in all parts of the Presidency; it is found, too, in Australia and in many of the islands of Polynesia. A variety with white flowers grows in Sálsette. *E. stricta* and *E. suberosa* are both trees, also with scarlet flowers. The first is common along the Gháts and the other occurs in the Kánara, Khándesh, and Gujarát forests. The genus is diffused throughout the tropics. A new species, *E. Australis*, has lately been introduced from Queensland and promises to be an acquisition to the naturalised flora of Bombay. *Grona Dalzellii* is a small Konkan climber, as is also *Galactia tenuiflora*; the latter is distributed to America, Australia, and Eastern Africa. *Butea frondosa*, a small crooked tree, covers large tracts of country in Khándesh,

Eastern Gujarát, Káthiáwár, and the Deccan; it bears abundance of showy scarlet flowers, which appear in February. An extensive jungle of this tree in full bloom presents a mass of colour the magnificence of which can hardly be surpassed. In the Konkan and Kánara it is comparatively infrequent. *B. superba* is a gigantic climber of the Dáng forests; it also bears large scarlet flowers. *Spatholobus Roxburghii*, another extensive woody climber with white or red flowers, occurs in the Konkan jungles. *Canavalia ensiformis* is a common Konkan herbaceous climber, of which there are several varieties both wild and cultivated; the pods are eaten as vegetables. The genus is widely distributed to tropical regions and has several American representatives. *Pueraria tuberosa*, a member of an Asiatic genus, is a twining shrub with showy blue flowers and an immense tuberous root which is sometimes eaten. The plant is common in the Konkan jungles. *Phaseolus* is a widely spread genus of herbaceous climbers, mostly tropical, many species of which are cultivated as pulse. Five or six are found wild in this Presidency, principally in the Konkan and Ghát jungles. *P. trilobus*, also an African species, abounds in the Deccan *P. vulgaris*, the kidney bean, is cultivated in Bombay; it is not known in the wild state, but is supposed to be a native of India. Amongst the other members of the genus which are commonly cultivated in Western India, *P. lunatus*, *P. aconitifolius*, *P. Mungo*, and *P. radiatus* are best known. All appear to be Indian plants. *Vigna vexillata*, a climber with a very extensive tropical distribution, is common in the Konkan north of Bombay. *V. catiang* is a well-known cultivated plant. *Clitorea ternatea*, a cosmopolitan tropical species, and *C. biflora* are two very common plants during the rainy season; they have beautiful deep blue flowers. Two varieties of the first, which is a climber, have white and lilac flowers respectively. Two or three species of *Dolichos*, members of a widely diffused tropical genus of herbaceous twiners, occur in the Konkan jungles. *D. lablab*, as well as *D. biflorus*, are familiar cultivated species. Several species of *Atylosia*, a genus common to India and Australia, are plentiful in the Konkan. One is a shrub and the others are small climbers usually with yellow flowers. *Cylista scariosa*, the solitary representative of the genus, is a very common climber; its large white membranous calyx makes it a conspicuous object in the Konkan jungles. *Rhyncosia*, a large tropical genus, gives at least two species to the Bombay flora. *R. minima*, a climber, abounds in the Deccan and Gujarát; it is cosmopolitan in the tropics. *R. cyanosperma*, a shrubby plant with yellow flowers and blue-black seeds, occurs somewhat sparingly on the Southern Gháts. African varieties, with white or red flowers, are described. Several other species are indigenous to different parts of India. Four or five species of *Flemingia*, small shrubby or herbaceous plants, occur in the South Konkan. The genus is distributed to Asia, Africa and Australia. *Dalbergia* is a large and important genus of trees and woody climbers found chiefly in Asia and Africa, but extending also to the American and Australian tropics. Eight or nine species are known in Western India. The black heartwood of *D. sissoo* and *D. latifolia* is the Blackwood of Bombay. The first grows to a great size in the Dáng and Gujarát forests; the latter is commonest in Kánara and the Southern Marátha Country. *D. confertiflora*, *D. Stocksii*, *D. sympathetica*, *D. volubilis*, and *D. monosperma* are Konkan and Ghát climbers. *D. lanceolaria* and *D. paniculata* are timber trees of the Khándesh and Gujarát forests; the latter also occurs in Kánara and on the eastern slopes of the Gháts. *D. melanoxylon*, an African species, is found in Bombay and Poona gardens. *Pterocarpus marsupium*, a large handsome tree, occurs in most parts of the Konkan and in the Dáng and Kánara forests, also in the Panch Maháls. The red astringent gum, called Kino, exudes from its bark, and its timber is hard and durable. The genus is

widely spread over India and extends to the tropics of Africa and America *Pongamia glabra*, the sole representative of the genus, is a well-known tree in every part of the Presidency. In Western India it attains its greatest size in Khándesh and Gujarát, where it is much planted about villages; it is found also in Australia and in some of the neighbouring islands. About six species of *Derris*, a scattered tropical genus of trees and woody climbers, are contained in the Bombay flora. *D. scandens* with *D. robusta*, *D. uliginosa*, *D. brevipes*, and *D. Heyneana* are Konkan climbers. *D. Canarensis*, an immense climber, may be seen stretching over the highest trees of the Kánara jungles; it bears a profusion of white flowers, and when in full bloom is a gorgeous plant. The first mentioned species is nearly as handsome. *Sophora Wightii*, a small shrub with yellow flowers, and belonging to a widely diffused tropical genus, occurs in the Deccan. *S. tomentosa*, probably indigenous also, is sometimes seen in gardens.

Having now disposed of the indigenous plants of *Papilionaceæ*, the more important species, not previously mentioned, which are cultivated in Western India, may be noticed. Amongst these are *Pisum sativum*, the Pea; *Lathyrus sativus*, the Vetch; *Cajanus Indicus*, the Pigeon-pea; *Arachis hypogæa*, the Ground-nut; *Medicago sativa*, the Lucern; *Cyamopsis psoralioides*, the "Gaur"; *Ervum lens*, the Lentil; *Trigonella fœnum-græcum*, the Fenugreek; and *Psophocarpus tetragonolobus*, the Chevaux-de-frise bean. The greater number of the cultivated *Papilionaceæ* appear to have been originally natives of Egypt and Abyssinia; some of them are said to be still found wild in those countries; and in all parts of tropical and sub-tropical Africa they are largely cultivated.

The indigenous members of the sub-order *Cæsalpinieæ* are chiefly large trees and armed woody climbers; a few are small shrubs, or even annual herbs. At least six species of the widely diffused tropical genus *Cæsalpinia*, four of which are thorny climbers, are found in various parts of the Presidency. *C. bonducella* may be seen everywhere, often planted however. It appears to be indigenous to all moist tropical countries, sometimes one, sometimes another being assigned as its original habitat. The seeds are asserted to possess antiperiodic properties. *C. Nuga*, *C. sepiaria*, and *C. mimosoides* are thorny climbers of the Konkan jungles. The first has large yellow fragrant flowers. The second is commonest in the Deccan: it makes an excellent hedge plant. *C. Sappan*, a prickly shrub or small tree with bright yellow flowers, occurs in the South Konkan and Kánara. The heart-wood furnishes a red dye. *C. pulcherrima* is a handsome shrub, with showy scarlet or yellow flowers, common in Bombay gardens. It is said to be a native of Arabia and Africa, whence it was introduced into India, but in the shady ravines of the Khándesh hills I have seen it undoubtedly wild. *C. coriaria*, the Divi Divi, a native of tropical America, is now a rather common tree about Bombay. Its pods contain a large quantity of tannin. *Mezoneurum cucullatum*, a thorny climber, is common on the Gháts. *Poinciana elata*, a tree with white and yellow flowers, occurs wild in Gujarát. *P. regia*, the Gulmohr, now so abundant in Bombay, is a native of Madagascar. A third species, from Chili, *P. Gillesii*, is sometimes seen in gardens. *Wagatea spicata*, the sole representative of the genus, is a thorny shrub with long spikes of scarlet and orange flowers; it is common in the Konkan, on the Gháts and in parts of Khándesh. The great genus *Cassia*, containing nearly 400 species, is distributed to the tropics of both the Old and the New Worlds, and is especially abundant in America. India possesses several species: ten or twelve are found in this Presidency, some of them extending to Africa. *C. fistula* is familiar to most people; the tree is common in all the forest districts, from Kánara to Gujarát, and

is besides frequently planted near towns and villages. It may be easily recognised by its large hanging racemes of bright yellow flowers, which appear in the hot season, and by its long cylindrical pods. *C. occidentalis*, *C. sophera*, and *C. tora* are annual weeds with yellow flowers, abundant everywhere during the rains. They are cosmopolitan in the tropics. *C. auriculata* is a yellow-flowered straggling shrub very common in the drier parts of the Presidency, more especially in Khándesh and Northern Gujarát. *C. obovata*, one of the sources of Alexandrian Senna, is a common Gujarát shrub. The Bombay Medical Stores are supplied with senna from *C. angustifolia* which, wild in Sind and Abyssinia, is cultivated at Ganesh Khind. *C. montana* is a Ghát shrub, and *C. pumila* occurs in the Deccan, Gujarát, and Cutch. *C. absus*, another widely spread tropical species, is found in the Konkan. *C. glauca*, not indigenous to this side of India, is a common garden tree. *C. Sumatrana*, from the Eastern Archipelago, grows to a large size in the vicinity of Poona, where it is much used as a roadside tree. *C. bicapsularis*, a Brazilian shrub, may frequently be seen in Bombay gardens. *Cynometra ramiflora*, a member of a cosmopolitan tropical genus, is a small Konkan shrub. *Hardwickia binata*, an elegant tree furnishing valuable timber, occurs in Khándesh and Kánara. *Saraca Indica*, a small tree with graceful drooping foliage and showy red and orange flowers, is plentiful throughout the Konkan. *Tamarindus Indica*, the Tamarind, is planted in every part of the Presidency. In Gujarát and Káthiáwár it grows to an immense size. Although usually spoken of as indigenous to India, its original home may with greater truth be ascribed to tropical Africa, from whence it has spread to both Asia and America. It is the only member of the genus; one of its varieties, however, being sometimes described as a distinct species, *T. occidentalis*, the West Indian or red Tamarind. *Bauhinia* is a large widely spread tropical genus, of which nearly forty species are natives of India; not more than five or six are indigenous here. *B. tomentosa* is a common ornamental shrub of Bombay gardens. *B. racemosa*, the sacred tree of the Dasara festival, is found everywhere. *B. Malabarica* is a small South Konkan tree. *B. Lawii* and *B. Vahlii* are Ghát and Konkan climbers; the latter grows to a great size, overtopping the highest trees. *B. acuminata*, a shrub, and *B. purpurea* and *B. variegata*, both trees, all natives of other parts of India, are pretty common in Bombay. The two latter are often used as roadside trees.

Besides the naturalised plants of this sub-order which have been already mentioned, there are still a few others requiring notice. *Peltophorum ferrugineum*, a tree with fragrant yellow flowers, a native of the Indian Archipelago, has recently been introduced. *Parkinsonia aculeata*, a thorny shrub or small tree with drooping branches and yellow flowers, from tropical America, abounds everywhere. *Hæmatoxylon campechianum*, the Logwood, a native of Central America, flourishes in Western India, where it might doubtless be profitably grown. *Schizolobium excelsum*, a large Brazilian tree, has been lately introduced into Bombay, where, so far, the climate appears to suit it perfectly. It promises to rival in magnificence the *Poinciana regia*.

The third sub-order—*Mimoseæ*—includes, like the preceding one, numerous useful trees and thorny climbers. *Neptunia oleracea*, a small annual plant, cosmopolitan in the tropics, is found in Konkan tanks. *N. triquetra*, another widely distributed annual, is common in pastures. *N. plena*, an American species, is common in wet ground near Bombay. *Xylia dolabriformis*, the only representative of the genus, is a valuable timber tree which abounds in the South Konkan and Kánara. *Entada scandens* is an immense climber with twisted stems, common along the Gháts. Its pods

are frequently from three to four feet in length and four inches broad. This species occurs likewise in all the moist tropical regions of Africa, America, and Australia. *Prosopis spicigera*, a thorny tree, is abundant in parts of the Deccan and in Khándesh, Gujarát, and Cutch. It extends through Sind to Persia. *Dichrostachys cinerea*, known by its heads of yellow and rose coloured flowers, is a common shrub in the same parts of the Presidency. *Mimosa rubicaulis* and *M. hamata*, belonging to a large American genus, are both thorny shrubs, common, the first in the Konkan, and the second in the Deccan, Gujarát, and Cutch. *M. pudica*, the Sensitive Plant, a Brazilian species, is abundant about Bombay and in parts of the Deccan. The great genus *Acacia*, consisting of more than 400 species, is comparatively infrequent in India. Two-thirds of it are exclusively Australian. In the Bombay flora we have but ten or twelve representatives, some of them cosmopolitan tropical plants. A very common shrub or small tree near Bombay is *A. Farnesiana*. It grows everywhere in the tropics, and would seem to be a doubtful native of Western India. Its yellow flowers are delightfully fragrant. The best known species of this genus is *A. Arabica*, the "Bábul." It is found in all parts of the Presidency, attaining its greatest size in the black soil of the Deccan. In Khándesh, the Konkan, and Gujarát it is much less luxuriant, and in the northern arid districts of the latter province, although very abundant, it becomes a stunted shrub. This tree is distributed to Arabia, Egypt, and Eastern Africa, apparently delighting in arid climates, but not objecting to good soil and a moderate degree of moisture; under the latter conditions it generally develops into a large and valuable timber tree. It is the source of gum-arabic. Two or three varieties of it are known in the Deccan and Sind. *A. eburnea* and *A. tomentosa* are Khándesh and Deccan trees: the latter is common, too, in Eastern Gujarát. *A. leucophlœa* is a common tree of the Southern Marátha Country, also of Cutch. In the former district its astringent bark is much employed in the process of distilling spirits from palmjuice and sugar. *A. suma*, a tree with white bark, is common in the North Konkan, and is found, too, in parts of Gujarát. *A. catechu*, a small tree with rough dark-coloured bark, abounds in the North Konkan, occurring also in Khándesh, the Deccan, and Gujarát. The astringent drug called Black Catechu or "Káth" is extracted from the close-grained, heavy, red heartwood of this tree. *A. sundra*, which somewhat resembles the preceding, is chiefly a Deccan tree, occurring, too, in Kánara. *A. latronum* is another Deccan tree and may easily be recognised by the formidable spines with which it is armed. Three prickly climbers—*A. concinna*, *A. intsia*, and *A. pennata*—abound in the Konkan jungles. The second is found also in Gujarát and Káthiáwár, and the third extends to tropical Africa. A naturalised species of this genus, probably *A. glauca*, is a fast-growing shrub abundant in the vicinity of Bombay. It is a great pest in gardens, from whence its numerous suckers and spreading roots make it difficult to eradicate. Attempts have been made to introduce some of the Australian *Acacias*, particularly *A. melanoxylon* and *A. dealbata*, but hitherto with only partial success. Five species of *Albizzia*, a genus spread through tropical Asia, Africa, and Australia, are common on the Gháts and in the neighbouring parts of the Deccan. *A. Lebbek* and *A. odoratissima* are both large timber trees of the Ghát and Konkan forests. They are often planted along roadsides and near villages in the Deccan, Gujarát, and Khándesh. The first extends to Africa and Australia. *A. procera* is a valuable timber tree which grows to a great size in most parts of the Konkan. *A. stipulata* is found with it. *A. amara*, also an African tree, is an exceedingly handsome species frequent along the banks of the Deccan rivers and on the higher Gháts. It is especially abundant at Mátherán. Of the cosmopolitan tropical

genus *Pithecolobium* we possess but one indigenous species, *P. bigeminum*. It is a large tree occurring in the Konkan. *P. dulce*, a Mexican tree, is now very common in Western India. It is of rapid growth and well suited for a shade tree; it also makes excellent hedges, and its pod might be used as fodder. *P. saman*, a tree of Central America, has recently been introduced. Amongst the naturalised species of this sub-order which remain to be mentioned are *Adenanthera pavonina* from Southern India, *Parkia biglandulosa*, a large tree from Malacca, and *Inga hæmatoxylon*, an American shrub. The first is a very common tree in Bombay; its bright scarlet seeds are well known. The pods of the second contain a quantity of eatable farinaceous pulp. The third bears showy red flowers.

Rosaceæ.—This large order is mainly confined to the north temperate zone. Numerous representatives occur in the mountainous regions of India. Not more than four are known to be indigenous in Western India, and these are found only on the higher Gháts. *Pygeum Gardneri* is a large tree common at Mahábaleshvar; it bears yellowish white flowers and a fruit not unlike a greengage plum in appearance. The other indigenous plants of the order are three species of *Rubus*, a very widely diffused genus of the northern hemisphere. *R. moluccanus* is one source of the Mahábaleshvar raspberries. *R. ellipticus* and *R. lasiocarpus* occur on the Southern Gháts. The latter produces a very fair edible fruit. *R. idæus*, the common Raspberry, has been cultivated successfully at Mahábaleshvar. *Fragaria vesca*, a Himálayan, and also a British, species, is probably the parent of the different varieties of Strawberry which are so well grown at the same place. *Rosa*, the Rose, has from time immemorial been cultivated in Western India. The commonest kinds here are *R. damascena*, from the flowers of which attar is principally made; *R. centifolia*, the Cabbage rose; *R. Indica* and *R. microphylla*, the China roses; *R. fragrans*, the yellow Tea rose; and *R. rubiginosa*, the Sweet-briar. The original specific characters of most of these Roses have been so altered by crossing and cultivation that it is now all but impossible to decide which is a distinct species and which is not. *Eriobotrya Japonica*, the Loquat, a Chinese fruit tree, is sometimes seen in Deccan gardens. *Pyrus malus*, the Apple, has been planted at Poona and Ahmednagar, producing however but very indifferent fruit. A few trees of *P. communis*, the Pear, occur in Bombay. Attempts have been made to cultivate the Plum and Cherry, *Prunus domestica* and *P. cerasus*, but hitherto without success. *P. amygdalus*, the Almond, is sometimes found in gardens; and *P. persica*, the Peach, has succeeded very fairly at Panchgani.

Saxifragaceæ is another family of the northern temperate zone and is well represented in the mountainous districts of India. The Bombay flora possesses but one indigenous species, *Vahlia viscosa*, a small herbaceous plant with white or yellow flowers; it is common in Gujarát and extends into Persia, Egypt, and tropical Africa. *Hydrangea hortensis*, a well-known Chinese shrub, belongs to this order; it occurs in Bombay and Poona gardens occasionally.

Crassulaceæ is a widely diffused order of succulent plants; they are commonest in arid temperate regions, especially in South Africa. Four or five are indigenous to Western India. *Tillæa pentandra*, a creeping plant, occurs in the Konkan, and spreads to tropical Africa. *Bryophyllum calycinum*, a cosmopolitan tropical plant, is found in nearly every part of the Presidency, and frequently in gardens. Its leaves possess the curious property of forming buds at their edges which develop, drop off, and produce new plants. *Kalanchœ glandulosa*, belonging to a South African genus, together with *K. laciniata*, occur in the Deccan; both are also African species.

Droseraceæ.—Two species of this small order, *Drosera Burmanni* and *D. Indica*, are found in the Konkan during the rainy season. They are small herbaceous plants and are very widely distributed through the Old World tropics. Like the common Sundew, *D. rotundifolia*, a native of Great Britain, these two plants bear on their leaves irritable glandular hairs, which possess the power of closing round insects that may happen to alight on them. The plants would appear also to be capable of digesting and assimilating the insects and other animal matter which are thus secured.

Of the small but widely diffused order, Halorageæ, we have two indigenous species. *Serpicula Indica*, a little creeping plant, occurs in the Deccan, and *Myriophyllum Indicum*, an aquatic species, is common in tanks.

Rhizophoreæ, another small order, consists of trees or large shrubs which inhabit principally the salt marshes near the mouths of tidal tropical rivers. *Rhizophora mucronata* is a tall shrub abundant along the coasts of India, Burma, Africa, Australia, and the islands of the Eastern Archipelago. In the salt swamps of tropical Africa it exists in enormous quantities; the labyrinth formed by their interlacing aerial roots, together with the mud of the swamps, is known as a Mangrove bog. *Bruguiera gymnorhiza* and *B. parviflora* are small trees common along the Káthiáwár, Gujarát, and Konkan coasts. *Carallia integerrima* is another small tree frequent on the Gháts and in Kánara. Most of these species extend to Australia.

Combretaceæ.—Several large and useful timber trees belong to this order, and many of its species are extensive climbers. An astringent principle is contained in the bark and fruit of nearly all its members. The order is distributed almost exclusively to the tropics, both of the Old and New Worlds. A considerable number of species are contained in the Flora Indica, about ten of them being indigenous to this Presidency. *Terminalia* is an important genus of timber trees distributed to most parts of tropical Asia and Africa. *T. belerica* grows to a great size in all the Bombay forests, from Kánara to Gujarát; its seeds, which taste like almonds, are eaten. *T. chebula* is a common tree in the inland parts of Kánara and on the eastern slopes of the Gháts; its fruits are very astringent and are exported in large quantities from Bombay for tanning. *T. tomentosa*, a tree with winged fruit, abounds in Kánara, the Konkan, and in the Dáng forests. It occurs also, but more sparingly, in the Deccan, and is, besides, found in many other parts of India. On the Gháts and Konkan hills it exists in enormous numbers, but, from being constantly cut down for firewood, it appears more or less stunted. It yields a hard and durable timber. *T. arjuna* is an immense tree in the Khándesh, Dáng, and Gujarát forests; it reaches a great size, too, in the Kánara and Belgaum forests. *T. paniculata* is another large tree of the South Konkan and Gháts. *T. catappa*, indigenous to Southern Asia, but a doubtful native here however, is a stately spreading tree found in most parts of the Presidency. Its fruits, together with those of *T. chebula*, are known as Myrabolans and are largely exported. *Calycopteris floribunda* is a common climbing shrub in the Konkan jungles. *Anogeissus latifolia* is a large useful timber tree found in all the forest districts; it yields a hard white gum. *Lumnitzera racemosa*, a shrub with spikes of white flowers, exists in the salt marshes along the coast; it is also an African and Australian species. *Combretum extensum* and *C. ovalifolium*, members of an extensive tropical genus, widely distributed, are large climbing shrubs common in the Konkan and Ghát jungles. The latter species is also found in Gujarát. *C. grandiflorum*, with *C. coccineum* and *C. purpureum*, are gorgeous scarlet climbers of Bombay gardens; the first is an African and the other two are

Brazilian species. *Quisqualis Indica*, another common Bombay climber, with showy red and white flowers, is indigenous to Bengal and tropical Africa.

MYRTACEÆ.—This large and important aromatic order is distributed to all the warmer parts of the globe. The Indian flora possesses a considerable number of representatives, chiefly of the great genus *Eugenia*. This contains upwards of 700 species, dispersed over tropical Asia and America, but few being found in either Africa or Australia. The Bombay flora boasts of only eight or nine representatives, all trees, and occurring on the Gháts and in the Konkan and Kánara. The species best known is *E. jambolana*, the "Jámbhul." It is found in all parts of the Presidency except in the driest districts; on the higher Gháts it grows in great quantities. It is common, too, in Gujarát and Káthiáwár, where many of the planted specimens reach a large size. In the Deccan it is often cultivated for its fruit. *E. Zeylanica*, a tree resembling a large Myrtle, together with *E. caryophyllæa*, *E. lanceolaria*, and *E. Willdenóvii* occur on the Southern Gháts. *E. salicifolia*, *E. læta*, and *E. rubicunda* are common along all the higher Gháts. *E. pimenta*, a West Indian species, is the Allspice, and *E. aromatica*, a native of the Indian Archipelago, is the Clove tree; the latter, together with *E. jambos*, the Roseapple, and *E. malaccensis*, are found in Bombay gardens. *Barringtonia racemosa*, a timber tree, is plentiful in Kánara; it bears a profusion of showy pink flowers. *B. acutangula*, a small tree or shrub with scarlet flowers, occurs about the Konkan creeks. The first species is also an African tree. *Careya arborea*, a tree, is common everywhere in the Konkan, Kánara, and Dang forests. It bears large white flowers and fruit the size of an apple. Among the remaining naturalized plants of this order found in Bombay are *Myrtus communis*, the Myrtle, and *Psidium guyava*, the Guava of the West Indies. Some members of the great Australian genus *Eucalyptus* have been introduced here within the last few years. *E. globulus*, the Blue Gum, although repeatedly tried, has utterly failed in all parts of the Presidency except at Panchgani. Even there the few specimens which remain are more or less stunted. The only species, among those introduced, which at all promises to grow in the Konkan with any degree of vigour, is *E. saligna*, a native of Queensland. It finds here a congenial tropical climate.

MELASTOMACEÆ.—This extensive family inhabits principally tropical America. Several species are found in India, most abundantly however in the Southern Provinces. Five occur in this Presidency. It is worthy of note that none of the Indian genera of this order possess a single species which is indigenous to America; most of them have, however, Australian and African representatives. Except in an occasional instance, the plants of the order are endowed with no qualities of importance. Many of them are cultivated for their beautiful flowers. *Osbeckia truncata* is an annual plant found in grass lands in the Konkan. *Melastoma malabathricum*, a shrub with showy rose-coloured flowers, occurs in the jungles of the South Konkan and Kánara, and *Sonerila scapigera*, a small plant, on the Gháts. The first spreads to the Archipelago, Australia, and Polynesia. *Memecylon edule* is a very common tree on the higher Gháts. In the cold weather it is covered with beautiful violet-coloured flowers, from which a dye is obtained. *M. terminale* is a small shrub of the Southern Gháts. This large genus exists in considerable numbers in South India, Ceylon, Africa, and Australia.

LYTHRARIEÆ.—The greater portion of this order is indigenous to tropical America, although a considerable number are also to be found in the tropics of the Old World. A few exist in Europe and three in Great

Britain. About twelve belong to the Bombay flora. Seven or eight species of *Ammania*, a widely diffused tropical genus, are found on the Gháts and in the tanks and wet ground of the Konkan. They are all herbaceous plants. The leaves of *A. baccifera*, an exceedingly common Konkan species, are very acrid and are used here as a vesicant. *A. senegalensis*, a very variable plant, and *A. salicifolia* are, as well as the first, also natives of Africa and Australia. *A. octandra* is a very common weed in most parts of the Presidency. *Woodfordia floribunda*, the only member of the genus, is a shrub with handsome red flowers, common in the Konkan, Khándesh, and Gujarát, and spreading to China, Africa, and Madagascar. *Lawsonia alba*, the Henna, is a small shrub cultivated throughout most eastern countries. It is indigenous to Arabia and Egypt, probably also to Gujarát and the Deccan. *Lagerstrœmia reginæ* is a tree found near river banks in the Konkan and Kánara, and in other moist parts of India. Its timber is valuable, and its abundance of large showy lilac flowers, which appear at the beginning of the rains, render it a conspicuous object. *L. parviflora* is an immense timber tree of the South Konkan and the Kánara forests; it produces one of the varieties of "Benteak." *L. lanceolata* is another timber tree of the same districts; it is found, too, in the Khándesh forests and in the Deccan. *Sonneratia acida*, found also in tropical Africa, the Indian Archipelago, and Australia, is a small tree growing along the coast in salt marshes and creeks. *Punica granatum*, the Pomegranate, is the single representative of an anomalous genus which has been placed at the end of this order. It is cultivated throughout India and in most tropical and sub-tropical countries, and is found truly wild in Northern India, Beluchistan, Persia, and Asia Minor.

ONAGRARIEÆ.—Of this widely diffused order the majority of the species are distributed to North America. Some are found in Europe, India, Australia, and New Zealand, and several in Africa. *Jussiæa repens*, a member of a tropical aquatic genus, is a small plant with yellow flowers, common near tanks. *J. villosa* occurs near wet places in the Konkan and on the Gháts; the former extends to Australia and the latter to Africa. *Ludwigia parviflora* is a very common annual plant in the same localities and is widely spread through the tropics of the Old World. *Trapa bispinosa*, a member of a small aquatic genus which is found in all the warmer parts of Europe, Asia, and Africa, exists in great numbers in tanks throughout the Presidency. It appears to be quite as abundant in all the great African rivers, especially in the Zambesi; its seeds, called Water Chestnuts, are eaten. The *Fuchsia* of gardens, a South American plant, belongs to this order, and so does *Œnothera biennis*, the Evening Primrose of Mahábaleshvar gardens.

SAMYDACEÆ is a small family of trees and shrubs found chiefly in the tropical parts of America. Several, however, occur in Africa and Asia, and the genus *Casearia* is distributed to both worlds. *C. tomentosa*, a small tree with greenish-yellow flowers, occurs in the Konkan and on the Gháts, as well as in other parts of India. The acrid milky juice of its fruit is used to poison fish. *C. graveolens*, a small tree, with *C. lævigata* and *C. rubescens*, shrubs, are found in the South Konkan. *Homalium Zeylanicum* is a Ghát tree. The genus to which it belongs spreads to Africa, Australia and America.

PASSIFLOREÆ.—The plants of this order are nearly all climbers, the greater number being indigenous to tropical South America. In the Old World they are comparatively rare, Africa perhaps being most favoured. But few exist in India; only one, *Modecca palmata*, is found in this part of it. It is a rather rare climber with a large thick woody

root, greenish flowers, and orange fruit, occurring in the South Konkan and the inland parts of Kánara. The genus is Asiatic, African, and Australian. The different kinds of Passion flower, so common in Bombay gardens, are South American species of this order. *Carica papaya*, the Papaw, now planted everywhere about Bombay, also belongs to it.

CUCURBITACEÆ.—A large order of annual climbing plants distributed throughout all the warmest parts of the globe, more especially to Africa, where fully half the genera are represented. Although extensively cultivated as fruits and vegetables, but few are indigenous to temperate climates. Both wild and cultivated they are very common in India, and are found in every part of the country, being most abundant in the moister regions. In Western India about twenty species are indigenous, and these, often existing in great numbers, form, during the rainy season, a characteristic feature of the Konkan and Ghát jungles. Two species of *Trichosanthes*—*T. cucumerina* and *T. palmata*—common in the Konkan, have fringed white flowers. They are also indigenous to Australia. *T. anguina* is the cultivated Snake-gourd. *Luffa amara* and *L. echinata* are abundant in the Konkan; the latter, too, in Gujarát. The fruit of *L. acutángula*, probably an African species, is a common vegetable in Bombay. *L. pentandria* is also cultivated. *Momordica dioica* and *M. charantia*, both with yellow flowers, abound in the Konkan and on the Gháts. The fruit of the latter is eaten as a vegetable. *Cucumis trigonus* and *C. pubescens* are found not only in every part of this Presidency, but all over India. The latter is with good reason supposed to be the parent of the cultivated *C. Melo*, the Melon. It is also an African species. *C. sativus*, the native country of which is unknown, is the Cucumber. *Citrullus colocynthis* is the Bitter Cucumber or Colocynth, a well-known purgative. It grows wild in the Deccan and Gujarát; also in Arabia, North Africa, and the South of Europe. *C. vulgaris*, another species indigenous both to India and Africa, is the parent of the cultivated Water-melon. *Cephalandra Indica*, with large white flowers and red fruit, is common everywhere and is also abundant in tropical Africa. *Bryonia* has representatives in all the temperate and tropical regions of the Old World. *B. dioica* is the sole British species of the order. *B. laciniosa* and *B. umbellata* are plentiful in most parts of the Presidency. The first may be recognised by its small red and white fruit; that of the latter is sometimes eaten. *B. Mysorensis* occurs in the South Konkan. *Mukia scabrella*, the only member of the genus, is common in all parts of Western India, also occurring in Africa and Australia. One species of *Zehneria*, bearing clustered red fruits, one each of *Ctenolepis* and *Rhynchocarpa*, with three of *Corallocarpus*, are found in Gujarát and the first also in Káthiáwár. *Zanonia Indica*, with small yellow flowers and conical fruit, is a rare plant found in parts of the South Konkan. Besides the cultivated species already noted, there are several others common in Bombay. The chief of these are the Pumpkins, *Cucurbita Pepo*, *C. maxima*, and *C. moschata*. *C. ovifera* is the Vegetable Marrow, and *Lagenaria vulgaris* the Bottle Gourd. *Telfaria pedata*, an enormous species with a perennial stem from fifty to one hundred feet in length, was once introduced into Bombay from Zanzibar. It has, however, now completely disappeared. The fruit sometimes reaches 60 lbs. in weight, and the large oily seeds taste like almonds. Almost all the Bombay genera of this order are represented in tropical Africa, while nearly half of the indigenous species just mentioned are common to both countries.

BEGONIACEÆ.—These are chiefly natives of South America. A few species are found in Asia and Africa. The genus *Begonia*, leaving out one anomalous plant, forms the entire order. It contains about 350 species. Many of these handsome foliage plants are cultivated in Bombay gardens.

B. crenata, *B. integrifolia*, and *B. trichocarpa*, the only indigenous species, are found in rocky places on the Gháts.

DATISCEÆ.—This little order consists of four species, only one of which, *Tetrameles nudiflora*, a large tree with yellow flowers, is found along the Gháts. Two of the remaining species are Indian and the fourth is a native of Mexico.

Some mention of the natural order CACTEÆ, which, with one exception from Western Africa, is entirely an American family, cannot be omitted here. A single American species, *Opuntia Dillenii*, the Prickly Pear, has spread in some districts of this Presidency to such an extent as to have become a noxious weed. In the Deccan, where it is largely used as a hedge plant, it generally forms dense jungles about villages. It has lately been proposed to use planted belts of it as barriers against the ravages of forest fires. One or two other species of *Opuntia*, introduced I believe when the cultivation of the cochineal was first attempted here, may be seen in Bombay gardens, along with *Cereus grandiflorus* and *Pereskia grandiflora*. A few additional examples of the order lately introduced, are now becoming pretty common.

FICOIDEÆ.—This is a comparatively large order of herbaceous fleshy-leaved plants, mostly natives of hot and dry regions. One species of *Sesuvium*, three of *Trianthema*, and three of *Mollugo* are common weeds throughout the Konkan, less so in Gujarát and the Deccan. One of the latter genus, *M. Glinus*, is cosmopolitan in the tropics. They grow most abundantly near the sea. The three genera are pretty widely distributed, four of the species found here being also indigenous to Africa. The Ice plant, *Mesembryanthemum crystallinum*, a native of the Cape, and the New Zealand Spinach, *Tetragonia expansa*, are sometimes seen in Bombay and Deccan gardens.

UMBELLIFERÆ.—This large, well-defined, and important natural family, deriving its name from the peculiar mode in which its flowers are arranged on the stalk, belongs principally to the temperate regions of the northern hemisphere. Within the tropics its species are rarely to be found, except on mountains and near the sea. In the north of India they are common in the Himálayás, and on this side about fifteen species occur in the Konkan and on the Gháts. Central Asia and Southern Europe appear to be the countries most favoured by the order. Several species are found in America, North Africa, and Australia. *Hydrocotyle Asiatica*, a cosmopolitan creeping plant of warm regions, is common in moist places in the Konkan. Another species, *H. tenella*, a native of Southern India, has lately found its way into Bombay gardens, where it has become a somewhat troublesome weed. A third, *H. valgaris*, is a British weed. *Bupleurum falcatum* is found in the Southern Marátha Country and also in England. Five species of *Pimpinella*, a large widely scattered genus, grow about the Konkan and Gháts. *P. monoica* occurs on the highest Gháts, while *P. laterifloră* is common in the Deccan. *Polyzygus tuberosus*, the sole representative of the genus, is found in the South Konkan. *Peucedanum glaucum*, belonging to a large tropical and sub-tropical genus, occurs near Belgaum; its root is edible and tastes like a carrot. *P. grandis*, which, like the last, has yellow flowers, grows on the Gháts. *P. sativum* is the Parsnip. *P. graveolens*, the Anise, is largely cultivated in Western India. *Heracleum Concanense* is found on the Konkan hills, and four additional species on the eastern slopes of the Gháts. Another member of this genus is the Cow Parsnip, one of the commonest British weeds. Several well-known aromatic species of this family are cultivated here; among them

may be mentioned *Fœniculum vulgare*, the Fennel; *Coriandrum sativum*, Coriander; *Cuminum cyminum*, Cumin; and *Carum ptychotis*, the Ajowan. The Caraway, *C. Carui*, is not, so far as I am aware, grown on this side of India. As articles of food cultivated in Bombay we have *Daucus carota*, the Carrot; *Apium graveolens*, the Celery; and *Carum petroselinum*, the Parsley. A variety of fœtid gum-resins, such as Assafœtida, Galbanum, Ammoniacum, &c., are yielded by Asiatic plants of this order.

ARALIACEÆ is a widely diffused order belonging to tropical and sub-tropical countries. Only one indigenous species, *Heptapleurum Wallichianum*, is known in Western India: it is a small tree, or sometimes, according to circumstances, a woody climber found along the Southern Gháts. The genus is distributed to the mountainous regions of India and to Africa and Australia. Several species of the order are to be seen in Bombay gardens: amongst these is the Ivy, *Hedera Helix*. This is indigenous, not only to Europe and the Himálayás, but to Northern Africa, Western Asia, and Japan. Within the last three or four years *Brassaia actinophylla* has been introduced from Queensland; it promises to be an exceedingly handsome tree and to do well in Bombay. *Aralia Guilfoylei*, brought here about ten years since from the Fiji Islands, is now one of the commonest Bombay shrubs. *Panax cochleatum*, *P. fruticosum*, and *P. obtusum*, natives of the Indian Archipelago, are scarcely less common shrubs. *Fatsia papyrifera*, the Chinese Rice-paper plant, a native of Formosa, may be found in a few of our gardens.

CORNACEÆ.—This small family has, like the preceding, but one representative in Western India. *Alangium Lamarckii*, a small variable tree with spiny branches and white flowers, is found in the Konkan jungles and in Kánara; it also occurs in the Deccan, and is very common in Eastern Gujarát: the fruit is sometimes eaten. A few species of the order exist in the Himálayás and two in Great Britain.

RUBIACEÆ.—In its importance to man this order holds a place second to none in the vegetable kingdom. When it is remembered that among its products are to be found Quinine, Coffee, and Ipecacuanha, this importance will be easily understood. It contains nearly 4,100 species spread over all the tropical and temperate regions of the globe. A large number are indigenous to India and are found in every part of the country. Between fifty and sixty—timber trees, shrubs, and herbs—belong to the Bombay flora. With few exceptions they are confined to the forest districts, especially of Kánara, the Konkan, and the Gháts. *Anthocephalus Cadamba*, a large handsome timber tree, is found near villages in the Konkan and Kánara, and in parts of Gujarát, not very abundantly however. It seems to be a doubtful native and has probably been introduced into this Presidency from Southern India. Its fruit, in shape and colour like a small orange, is sometimes eaten. *Stephegyne parvifolia* and *Adina cordifolia*, also timber trees, are found in the Kánara, Ghát, Khándesh, and Gujarát forests. Two other timber trees, *Hymenodictyon obovatum* and *H. excelsum*, grow in Kánara and on the Gháts. *Argostemma cuneatum* and *A. glaberrimum* are small herbaceous plants found, the first growing on rocks and the second on trees, in the South Konkan. *Oldenlandia* is a large tropical genus of herbaceous plants, of which ten or twelve species occur in the Bombay flora, distributed principally to the Konkan and the Deccan. *O. fœtida*, with blue flowers, is an exceedingly common weed in cultivated ground in the Deccan. *O. Heynii* and *O. Burmanniana*, with white flowers, abound everywhere. *O. Abyssinica*, another Deccan weed, is also an African species. Most of the others occur in the South Konkan. *Ophiorhiza Harrisonii*, a member of an Asiatic and Australian genus, is a

small weed of the Southern Gháts. *Mussænda frondosa*, a handsome shrub with orange flowers, is common in the Konkan and Ghát jungles; it may be easily recognised by the large white leaf into which one of its calyx segments has become developed. Several members of this genus are natives of Africa. *Randia* is a large tropical genus of shrubs and small trees, of which five or six species are common in Western India. *R. dumetorum*, *R. uliginosa*, *R. fragrans*, and *R. Webera*, all thorny shrubs with white or pale yellow flowers, are found in the Konkan and Ghát jungles from the Dáng forests southwards. The first abounds at Mahábaleshvar; it is also indigenous to many parts of Africa and to the Malay Archipelago. *R. longispina*, not unlike it, occurs in the Khándesh and Gujarát forests. *Gardenia lucida*, a member of a genus which is widely diffused through the tropical and sub-tropical regions of the Old World, is a small tree common in the Konkan and Kánara; it is often cultivated in Bombay gardens for its fragrant white flowers. The yellow resin which exudes from the leaf bud, forms part of the "Dikemáli" of the bázárs; the remainder of this is procured from *G. gummifera*, a large shrub of the Southern Marátha Country and Kánara. *G. latifolia* and *G. montana* are both small trees, the first occurring on the Gháts and in the Khándesh forests, and the latter in the Kánara and Gujarát forests. *G. florida*, a small slow-growing shrub with beautiful fragrant white flowers, a native of China, is frequent in Bombay gardens. *Diplospora sphærocarpa* and *D. apiocarpa*, both trees, and members of an Asiatic genus, are found on the Southern Gháts, and *Knoxia corymbosa*, a small shrubby plant, in the South Konkan. *Canthium* is a large genus distributed to Asia, Africa, Australia, and the South Sea Islands. *C. umbellatum*, an elegant tree with dark-green glossy foliage, together with three other species, are common along the higher Gháts. *Vangueria spinosa* is a small thorny tree with fruit like an apple, abundant on the Gháts opposite Bombay. The genus is very common in Africa. The large genus *Ixora* is found in nearly all tropical countries, more especially in Asia and Africa. *I. coccinea*, a shrub with beautiful scarlet flowers, abounds in some parts of the Konkan. *I. parviflora* is a small tree common on the Gháts, and with it are found two other shrubs of the same genus. *Pavetta Indica*, belonging to another considerable tropical genus distributed like the preceding, is a white-flowered shrub, plentiful on the Gháts. *P. siphonantha* and *P. villosa*, also shrubs, grow on the Southern Gháts. *Morinda citrifolia*—also indigenous to tropical Africa and Australia—and *M. tomentosa* are very common trees of the Konkan and Kánara. *M. bracteata* occurs in the South Konkan, and *M. exserta* in Eastern Gujarát. From the roots of the first mentioned a red dye is obtained. *Psychotria*, an immense genus, very abundant in tropical America, has two representatives in the Konkan, both insignificant shrubby plants. *Geophila*, *Saprosma*, *Lasianthus*, *Hamiltonia*, and *Spermacoce* have each one representative in the Bombay flora; they are all small plants occurring in the Konkan and on the Gháts. *Rubia cordifolia*, a member of the cosmopolitan genus from which the order takes its name, is a common herbaceous climbing plant on the higher Gháts. It is also a native of South Africa. Madder is obtained from the British species, *R. tinctoria*. Amongst the useful and ornamental plants of this family to be found in Bombay may be mentioned *Coffea Arabica*, the Coffee, a native of Abyssinia. It has been successfully cultivated at Belgaum, Sávantvádi, and Goa, and there are doubtless many other parts of the Ghát districts where the shrub might be profitably grown. Another valuable species, *C. Liberica*, a native of Western Africa, has lately been introduced into Bombay, where the climate has so far appeared to agree perfectly with it. At Mahábaleshvar attempts have been made to start a Cinchona plantation,

but an insufficient supply of water and an absence of shelter from the prevailing winds have effectually interfered with its success. *Cinchona succirubra*, *C. calisaya*, and *C. officinalis* are the species which have been principally planted there. The Ipecacuanha, *Cephaelis Ipecacuana*, indigenous to Brazil, has also been recently introduced; but although the Konkan climate is sufficiently moist, it does not, in Bombay at least, appear to flourish. It is probable that the vicinity of the sea in some way injuriously affects it, and it might possibly grow better a little further inland. As ornamental plants, species of *Serissa*, *Hamelia*, *Pentas*, *Rondeletia*, and *Catesbœa*, all flowering shrubs, belonging to this order, are to be seen in Bombay gardens.

Compositæ.—This, the largest natural family of the vegetable kingdom, contains upwards of 10,000 species, nearly all of which are herbaceous plants. They are diffused over every part of the tropical and temperate regions of the globe, but are most abundant in North America. The shrubby species inhabit chiefly the tropics and South Africa. In India the order prevails most in the temperate mountainous regions, while they are comparatively infrequent in the plains, bearing here a much smaller proportion to the whole vegetation than is the case in colder climates. In England, for example, they are twelve per cent. of the Dicotyledons; in Bombay, on the contrary, they bear a ratio to the same class of plants of only five per cent. Here, however, notwithstanding the comparative scarcity of species, the enormous number of individuals belonging to some of these species cannot fail to strike an observer. The same remark holds good with respect to certain members of the order which are indigenous to other countries,—the common British thistle, for instance; but in this Presidency, at least, it applies to a considerable number of the native species. It is to be noted, too, that a majority of the *Compositæ* belonging to the Bombay flora are found in the more elevated regions—the Ghâts and the Deccan—and this fact corresponds to what has been observed elsewhere in India concerning the distribution of the order. Another important fact is that, with very rare exceptions, the genera found in Western India are likewise diffused through different parts of Africa; a considerable number of the species are indeed common to both countries. So far as Western India is concerned, the order has not yet been fully worked out by botanists; besides those indigenous species about to be noticed, there is little doubt that a more extended research will enable us to add many more to the list.

Belonging to the tribe *Vernoniaceæ*, the genera represented in the Bombay flora are *Adenoon*, *Vernonia*, *Lamprachœnium*, and *Elephantopus*. In the first there is but one species, an Indian plant; the second is a very large genus, distributed to all parts of the tropics and most numerously to Brazil; one of its members, *V. cinerea*, also an African and Australian plant, exists abundantly in the Konkan; and *V. divergens*, a handsome flowering plant, is common on the higher Ghâts. The second tribe is represented here by only two genera—*Adenostemma* and *Ageratum*; *Adenostemma rivale* is found in Cutch; and *Ageratum conyzoides*, a cosmopolitan tropical weed with an exceedingly unpleasant odour, abounds in the Konkan. *Dichrocephala*, *Cyathocline*, *Grangea*, and *Conyza* are our indigenous genera of the third tribe—*Asteroideæ*. They occur chiefly on the Ghâts. The fourth tribe, *Inuloideæ*, is universally diffused; at least eleven of its genera are included in the Bombay flora—*viz.*, *Blumea*, *Laggera*, *Pluchea*, *Epaltes*, *Sphœranthus*, *Blepharispermum*, *Gnaphalium*, *Anaphalis*, *Cœsulia*, *Vicoa*, and *Pulicaria*. Some of these are represented in the Australian flora; others extend to Africa. Several species of *Gnaphalium* are British weeds. *Blumea holosericea* is abundant in the Konkan,

the Deccan, and on the Gháts; it may be recognised by the aromatic camphor-like odour of its leaves. Eleven or twelve additional species of the same genus occur in various parts of the Presidency, especially in the drier districts. The one named, as well as some of the others, have a wide tropical distribution. *Pluchea Indica*, a shrub, grows in Cutch and is also a native of Australia. *Cæsulia axillaris* is an exceedingly handsome species; it grows in wet places in most parts of the Presidency. Of the tribe *Helianthoideæ* we have representatives in the Bombay flora of the genera *Xanthium, Siegesbeckia, Eclipta, Sclerocarpus, Blainvillea, Wedelia, Spilanthes, Guizotia, Glossocardia, Bidens*, and *Glossogyne*. Most of these are dispersed throughout the tropics. Of the first mentioned, *X. strumarium* extends to Africa and the Mauritius, and *Siegesbeckia orientalis*, a Deccan plant, to Africa and Australia. *Eclipta alba*, a very common weed in moist ground, and *Spilanthes acmella* are cosmopolitan in the tropics. Several species of *Bidens* are British weeds. *Glossocardia bosvallea* is extraordinarily abundant in the Deccan. *Guizotia Abyssinica* is cultivated in many parts of the Presidency for the oil which is extracted from its seeds. The only species of the seventh tribe which are known here are *Artemisia Indica* and *A. parviflora*. The first occurs on the higher Gháts and is a well-known drug in Indian bázárs. The genus is widely distributed in the northern hemisphere, and several of its species are British plants. *Gynura simplex*, of the eighth tribe, grows on the Gháts; *Emilia sonchifolia*, an extensively diffused tropical weed, is common everywhere; and three or four species of *Senecio*, an immense cosmopolitan genus, are found in the Deccan. *Notonia grandiflora*, a large plant with yellow flowers, growing on the Deccan hills, has a reputation as a cure for hydrophobia; a second species, *N. balsamica*, occurs in the same localities. Of the tribe *Cynaroideæ*, *Goniocaulon Indica* and *Echinops echinatus* occur in Gujarát and the latter in Cutch and the Deccan as well. Five or six species of *Tricolepis*, an Indian genus, are found in the Deccan and Khándesh, and one in Gujarát and Cutch; they are all thistle-like plants. *Dicoma tomentosa*, of the twelfth tribe, a Gujarát and Káthiáwár plant, is widely spread throughout Africa. *Lactuca Heyneanus* and *L. sonchifolius*, species of a widely diffused genus of the thirteenth and last tribe—*Cichoraceæ*—are common everywhere. *L. sativa* is the garden Lettuce. *Launæa bellidifolia*, also a Cape and tropical African weed, is a common plant in the sandy districts of the Presidency—in Cutch especially.

Many plants of this great order are cultivated in Bombay either for use or ornament. *Cynara Scolymus* is the Artichoke. *Carthamus tinctorius*, the Safflower, is extensively grown in Khándesh and the Deccan. Oil is expressed from its seeds, and a pink dye is procured from its flowers. *Helianthus tuberosus* is the Jerusalem Artichoke and *H. annuus* the Sunflower. *Taraxacum officinale*, the Dandelion, is cultivated at Ganesh Khind for the Medical Stores. *Guizotia Abyssinica*, the "Kále Til," and *Lactuca sativa*, the Lettuce, have already been mentioned. Amongst the ornamental plants common in Bombay and Deccan gardens may be enumerated *Tagetes* and *Calendula*, the French and common Marigolds; *Bellis perennis*, the Daisy; with *Zinnia elegans, Dahlia, Coreopsis, Chrysanthemum*, and others. A Mexican plant, *Layascea mollis*, grows in enormous quantities in the neighbourhood of Poona and Kirkee, where it has become a perfect pest.

Goodenovieæ is principally an Australian order. Our only indigenous species, *Scævola Kœnigii*, is a shrub with large shining leaves and small white flowers; it is found near the seashore from Bombay southwards, and is also widely diffused over most of the warmer maritime regions of the Old World.

CAMPANULACEÆ is a considerable natural family dispersed over nearly all temperate and tropical regions, more especially of Africa and America : in South Africa they are abundant. Its largest and most important genus, the cosmopolitan *Lobelia*, has two representatives here. *L. trigona* is a small plant with blue flowers, found in the Konkan and Gujarát, and *L. nicotianæfolia*, a tall and very poisonous plant with white flowers, on the eastern slopes of the Gháts and on the Deccan hills. When young the latter bears a somewhat close resemblance to a tobacco plant. A few other species are indigenous to the mountainous regions of India, and two or three exotic members of the genus are ornamental annuals of Bombay gardens. Two species of *Cephalostigma*, both small herbs, occur in this Presidency; *C. hirsutum* is found in the Konkan and extends to Abyssinia. *Wahlenbergia agrestis*, belonging to a South African genus, is a weed with pale blue flowers, growing on the higher Gháts. *Sphenoclea Zeylanica*, a herbaceous marsh plant, cosmopolitan in the tropics, is common about Bombay. *Isotoma longiflora*, a highly poisonous West Indian plant with white flowers, and *Pratia radicans*, a minute creeper, said to be a native of China, are now common in Bombay gardens; the latter is used principally as an edging to flower beds.

PLUMBAGINEÆ is a small but widely distributed order, of which two species are indigenous to Western India. *Plumbago Zeylanica*, a perennial with white flowers, is common in rocky places in the Konkan and may be found, too, in the Deccan and Khándesh; it extends to tropical Africa and Australia. *P. capensis*, so common in our gardens, and a native of the Cape, has pale blue flowers; except in this respect it hardly seems to differ from the indigenous plant. *P. rosea*, a native of Southern India, is the well-known "Lal chitrak." All the species are exceedingly acrid. *Vogelia Arabica*, a small shrub with whitish leaves, is found in Gujarát and extends to Arabia and South Africa.

PRIMULACEÆ.— The common Pimpernel, *Anagallis arvensis*, occurs in the Deccan, more sparingly in Gujarát, and throughout most parts of India. It is the only plant of this family found in Western India. As "Poor Man's Weather-glass" it is a well-known British weed. It extends over Europe, Northern Africa, and Asia, and is said to be found even in Australia. The Deccan variety has either blue or rose-coloured flowers.

MYRSINEÆ is an order of trees and shrubs distributed to most parts of the tropics, especially to Asia and Australia. Six species, all shrubs, are indigenous to this part of the world. *Mæsa Indica*, with white flowers, grows on the Gháts, and its pea-like fruit is used to poison fish. The genus is represented in Arabia, Africa, and Australia. *Embelia basaal* occurs in the South Konkan, and *E. Ribes* and *E. glandulifera* on the Gháts. *Ardisia humilis*, our sole representative of a large and widely diffused tropical genus, is a handsome shrub with rose-coloured flowers common on the Southern Gháts. *Ægiceras majus*, a shrub with fragrant white flowers, is abundant in the salt marshes along the coast; it is distributed chiefly to the tropical Asiatic coasts and extends as far as Australia and Polynesia. Several species of this order occur in the hilly districts of India.

SAPOTACEÆ.—This family of trees and shrubs, yielding so many important products, is diffused principally through the Asiatic and American tropics; many species occur in Africa and several in Australia. The order is fairly represented in the Flora Indica, but the Indian Archipelago seems richest in species. Most of the genera mentioned below have a very extensive range. *Chrysophyllum Roxburghii*, a large tree bearing a fruit like an apple, grows on the Southern Gháts and in Kánara. *C. Cainito*, the West

Indian Star-apple, has recently been introduced into Bombay. *Sideroxylon tomentosum*, a middle-sized thorny tree, is very common along the higher Gháts; another common Ghát tree is *Isonandra Candolleana*. The dried milky juice of *I. gutta*, a native of the Eastern Islands, is "Guttapercha." *Bassia longifolia* and *B. elliptica*, both large trees, occur in the Kánara forests. *B. latifolia*, the well-known "Mowa," is found from Kánara to Khándesh and Gujarát; in the forests of the latter province and in the Dángs it is exceedingly abundant, growing to a great size, and having, at a little distance, very much the appearance of an Oak. In parts of Gujarát it forms quite a feature in the landscape. A considerable quantity of spirit is distilled annually from its saccharine fleshy flowers, and a fixed oil is obtained from its seeds; its timber, too, is valuable. *Mimusops elengi* is a large tree occurring in the South Konkan and in Kánara. *M. Indica* is a great spreading timber tree common in the Khándesh and Gujarát forests; near Bombay it dwindles into a stunted crooked bush. *M. Browneana*, a small but handsome fruit tree and a native of Australia and the Indian Archipelago, is sparingly cultivated here. The fruit of *Achras sapota*, an indigenous tree of South America and now common in Bombay, is the Sapodilla plum.

Ebenaceæ are mostly distributed to tropical and sub-tropical regions, especially of India. The principal genus of this order is noted for the dark colour and hardness of the timber furnished by several of its members. Amongst our indigenous species, *Maba buxifolia* and *M. micrantha* are two small trees found on the Gháts; other species occur in Australia and Africa. Seven or eight species of *Diospyros* are known in this Presidency. All are trees, and grow chiefly on the Southern Gháts and in Kánara. *D. melanoxylon*, from which one kind of ebony is procured, is found occasionally in Kánara, but plentifully in the Gujarát and Sátpuda forests; it bears an edible fruit. *D. chloroxylon* is a large tree occurring in parts of Gujarát and the Deccan. *D. paniculata*, *D. pruriens*, and *D. nigricans* grow on the Southern Gháts. *D. montana*, a middle-sized tree, and *D. Candolleana* are common along the Gháts; the former yields a beautifully variegated wood. The best ebony is the product of *D. ebenum*, a large Ceylon tree. *D. tessellaria*, a native of Mauritius, also yields valuable ebony. This large genus is widely diffused throughout the forest districts of India, and possesses representatives in nearly all the warmer parts of the world.

Styraceæ.—This small family inhabits chiefly tropical and sub-tropical Asia and America. A considerable number of species are found in India and Ceylon; but in this part of the country we have only two. *Symplocos spicata* and *S. racemosa*, both small trees, are common on the Gháts and in Kánara. The first extends to Australia. It may perhaps be mentioned that *Styrax benzoin*, a tree of this order and a native of the Indian Archipelago, is the source of the fragrant resin known as gum Benjamin or Benzoin—a familiar drug of the Bombay bázár.

Oleaceæ are widely distributed to both tropical and temperate regions. They are usually trees or shrubs, the latter being often climbers. *Jasminum*, a large and well-known genus, has six or seven indigenous representatives in Western India. All these are noted for their fragrant flowers and some are cultivated in gardens. *J. sambac*, the sweet-scented "Mogra", is a common Bombay shrub. I have never seen it wild however. *J. pubescens* and *J. Rottlerianum*, both shrubs with white flowers, occur in the South Konkan. *J. latifolium* is an abundant climber in the Ghát jungles; the delicate perfume of its white flowers must be familiar to residents at Mátherán and Maháballeshvar. *J. bracteatum*, another climber, is found in the Gujarát hills. Several additional species are common in other parts of India.

The genus extends to Africa, South Europe, and Australia. *J. officinale* is the Jessamine of English gardens, and is supposed to be originally a native of this country; indeed it is said to grow wild in the Himálayás. The night flowering Jessamine, *Nyctanthes arbor-tristis*, is a common shrub or small tree in Bombay gardens. It inhabits chiefly the Himálayan jungles, and has also been found wild in the Sátpuda forests in Khándesh. Its numerous sweet-smelling white and orange flowers appear in the evening and fall at sunrise, when the ground is thickly strewed with them. An orange dye is made from the tube of the corolla, and the rough leaves are used for polishing wood. *Schrebèra Swietenioides* is a tall timber tree found along the Northern Ghâts and in the Gujarát forests; its wood is very hard and close-grained. *Linociera Malabarica* is a small Ghát tree. Of the very widely dispersed genus *Olea* we possess two indigenous species. *O. glandulifera* and *O. dioica*, both small trees bearing bitter purple fruit, are abundant on the Gháts. *O. Europæa*, a native of South Europe, is the cultivated Olive. *O. fragrans*, a Chinese shrub, and said to be also indigenous to Eastern Bengal, is pretty common in Bombay gardens; it has deliciously scented white flowers. *Ligustrum Nilgiriense*, a shrub or small tree with fragrant flowers, grows on the Southern Gháts and in Kánara. *L. vulgare*, a British species, is the well-known Privet.

Salvadoraceæ.—Although this is a very limited order in point of numbers, consisting of hardly more than eight species, yet its distribution well illustrates the close affinity which exists between the Indian and African floras. *Salvadora* extends throughout North Africa, Arabia, and Persia to India. *S. Persica*, said to be the Mustard-tree of Scripture, is plentiful in most parts of the Presidency, especially near the sea and in salt soil; it is a small straggling tree with greenish yellow flowers and red berries tasting like cress. The bark of the root is exceedingly acrid.

Apocynaceæ.—This order is largely represented in tropical and subtropical regions, more especially in those of Asia, but in temperate climates they exist only in small numbers. The Indian species appear to prevail most in the southern districts of the Peninsula and in the moister parts of Bengal. The plants of this order are very often poisonous,—some of them virulently so. Between twenty-five and thirty species are indigenous to Western India, a considerable number of them being climbing shrubs. *Carissa carandas*, a spreading thorny shrub, forms by far the greater portion of the low Konkan jungles, and it abounds, too, in the Deccan, Gujarát, and Káthiáwár. Its purple fruit is edible. *C. hirsuta* occurs in the Southern Marátha Country. *C. lanceolata* grows on the Southern Gháts and is sometimes cultivated in gardens for its fruit, which, like that of the first, is edible and much larger besides. The genus extends to Africa and Australia. *Rauwolfia serpentina*, a member of a widely spread tropical genus, is a pretty shrub common in the Konkan, and *R. Nilgiriensis* occurs on the Southern Gháts. *Vinca pusilla*, a small annual plant with white flowers, grows in the Deccan, while *V. rosea*, an American species, is a familiar ornament of Bombay gardens. *Plumiera acutifolia*, the well-known "Khair Chámpa," is common near villages all over the Presidency; it is not found wild, and is probably not indigenous. *Ellertonia Rheedii* is a climbing shrub of the South Konkan. *Alstonia scholaris*, a spreading tree, is plentiful in Kánara; it is found, too, in various other parts of India and extends to Australia and tropical Africa. Its bark is said to possess antiperiodic properties. *Tabernamontana crispa*, a common Ghát shrub with fragrant white flowers, belongs to a large and widely diffused tropical genus. *T. coronaria*, with larger flowers, is found in the Konkan, and a double variety of it is abundant in gardens. *Holarrhena antidysenterica* is a common and well-known Ghát tree the bark of

which is employed medicinally. *Vallaris dichotoma* is a large climbing shrub, abundant in the Konkan and Deccan jungles. Its fragrant white flowers cause it to be frequently cultivated in gardens. *Parsonsia Rheedii* and *P. spiralis* are Konkan climbers. *Wrightia tomentosa*, a member of a small but widely distributed tropical genus, is a tree of the North Konkan, Khándesh, and Gujarát forest districts, and *W. tinctoria*, which much resembles it, occurs through the South Konkan and in Kánara. A third species, *W. Wallichiana*, is found with the preceding. *Nerium odorum*, a poisonous shrub with fragrant white or rose-coloured flowers, is common in the Khándesh ravines and dry river beds. It is undoubtedly indigenous, and appears in fact to be the wild form of the Oleander of Bombay gardens; it does not seem to differ materially from the European shrub *N. oleander*. *Ichnocarpus frutescens*, along with another species, are climbing shrubs of the Ghát and South Konkan jungles. The genus spreads to Africa and Australia. *Anodendron paniculatum* is an immense climber very abundant on the Gháts. An equally extensive climbing shrub, common in the Konkan, is *Chonemorpha macrophylla*. *Beaumontia Jerdoniana*, a handsome climber, is plentiful in Kánara, and occurs also in the Southern Marátha Country. *B. grandiflora*, a native of the Himálayan jungles, is one of our most splendid garden climbers. Amongst the exotic plants of this order which have become naturalised in Bombay may be mentioned three or four species of *Allamanda*, a South American genus. *A. cathartica*, and *A. purpurea*, with their large bright yellow flowers, are well-known Bombay shrubs. *Thevetia neriifolia*, an exceedingly poisonous shrub or small tree, from tropical America, with large yellow flowers, is pretty common about Bombay, as is also *Cerbera odollam*, a tall shrub with fragrant white flowers, and a native of Bengal, Seychelles, and Australia. *Roupelia grata*, a shrub from Western Africa, is another ornament of our gardens.

Asclepiadeæ form a large natural family which has much the same distribution as the preceding, but extends in considerable numbers beyond the limits of the tropics. They are, like it, characterized by the possession of milky juice; their poisonous properties are, however, much less pronounced. The species of this order abound in India, the Bombay flora containing at least forty, nearly all of which are climbers. *Hemidesmus Indicus* is a twining plant, plentiful everywhere in hedges and waste lands; it is known as the Indian Sarsaparilla. *Periploca aphylla*, a nearly leaf less shrub, is common in Cutch, and extends into Arabia and Egypt. *Cryptolepis Buchanani* and *Toxocarpus crassifolius* are common Ghát climbers. *Oxystelma esculenta*, a handsome climber with showy rose-coloured flowers, occurs in the Konkan jungles near river banks. *Calatropis gigantea*, a well-known shrub, is abundant in all parts of the Presidency, especially in the drier districts. *C. procera*, which closely resembles it, is somewhat less common and is found chiefly in the Deccan, Gujarát, and Cutch, extending through Persia and Arabia to Africa. Its milky juice is an acrid poison, and is said to have been one of the drugs used in this country for destroying female infants. Both species yield a fine silky fibre of great strength. *Holostemma Rheedii*, a twiner with fleshy red and white flowers, abounds in the Konkan. *Vincetoxicum pauciflorum*, a Deccan climber, belongs to a genus which is widely diffused through the temperate parts of Africa and Australia; it also extends on either side to South Europe and China. *Sarcostemma brevistigma* and *S. viminale*, both of them fleshy, leafless, partially twining plants, are found in the Deccan in stony ground; the former is common in Cutch, and the latter also occurs in Gujarát, and extends, too, as far as the Seychelles and the Cape. The genus has Australian and South American representatives besides. *Pentatropis microphylla*, a twining plant with fleshy leaves and green flowers, and belonging to another

African and Australian genus, is common in Cutch, Gujarát and the Deccan. *Dæmia extensa* is an abundant climber in every part of the Presidency. *Gymnema sylvestre* and *G. elegans* are Ghát climbers; the first is a very widely diffused tropical species. Four or five species of *Tylophora* are Konkan climbers. *T. asthmatica* occurs also in the Deccan. Other members of the genus are African and Australian, and the last mentioned is found in the Seychelles. *Cosmostigma racemosa*, the only plant of the genus, is a very common climber during the rainy season. One species of *Heterostemma* and one of *Oianthus* occur in the Konkan; the latter, *O. urceolatus*, exists also in the southern parts of the Deccan. Four or five species of *Hoya* grow on the Konkan and Ghát trees. *H. carnosa*, a native of the Archipelago and Australia, is the common Wax-plant of Bombay gardens. *Leptadenia reticulata* is an abundant Konkan climber; it bears fragrant green flowers. Another species, *L. Jacquemontiana*, is common in Káthiáwár and Cutch. Eleven or twelve species of *Ceropegia*, a widely diffused tropical genus, are found in the Konkan and Ghát jungles; they are all climbers, and some of them have tuberous roots. *Caralluma fimbriata*, a fleshy leafless plant, not unlike a Cactus in appearance, occurs in the Deccan in rocky places. These peculiar plants are essentially natives of arid climates and are found most abundantly in South Africa. Amongst the naturalised plants of this order common in Bombay may be mentioned *Asclepias curassavica*, a native of the West Indies and South America; it is said to be the Peruvian silk plant. *Stephanotis floribunda*, a most beautiful climber with fragrant white flowers, is from Madagascar. *Pergularia odoratissima* and *Cryptostegia grandiflora* are both natives of Bengal. The latter is an immense climber with showy rose-coloured flowers.

Loganiaceæ.—This small but very important order is scattered over the tropical and sub-tropical regions of the whole world. One species of *Mitreola* and one of *Mitrasacme*, small herbaceous plants, are found in the Konkan; both are also indigenous to Australia. *Buddleia Asiatica*, a member of a cosmopolitian genus, is a small Konkan tree. The widely dispersed tropical genus *Strychnos* contains some of the most poisonous plants known. Of our three or four indigenous species, *S. colubrina* is a climbing shrub found in the South Konkan and Kánara. Its wood, known as Snake-wood, is supposed to be an antidote to the poison of venomous serpents. *S. Nux-vomica*, a middle-sized tree, is exceedingly common in the same localities. Its fruit, in appearance like a small orange, contains the Nux-vomica seeds from which the drug Strychnine is extracted. *S. potatorum*, also a tree, occurs in Kánara and the Southern Marátha Country; its seeds, called Clearing-nuts from the property they possess of quickly clearing muddy water, are non-poisonous. Other species of this genus occur in various parts of India. *S. Ignatia*, a native of the Philippines, yields St. Ignatius' beans, which contain a large quantity of Strychnine. *S. tieute*, an indigenous tree of Java, yields the Upas-tieute poison, and from *S. toxifera*, a native of Brazil, is obtained the drug Curare. The yellow Jessamine, *Gelseminum sempervirens*, a highly poisonous shrub, belongs to this order. It is a native of North America, and has of late years been introduced into a few Bombay gardens.

Gentianeæ is a cosmopolitan order of herbaceous plants which inhabit chiefly the mountainous regions both of tropical and temperate countries. A few, however, are found in the hot plains of India. The Himálayan flora is rich in species, and about fifteen are indigenous to this Presidency. Three or four plants of the Indian genus *Exacum* are found in the Konkan; all have blue flowers. *Enicostema orientalis*, the only member of the genus, is common in Gujarát and Cutch; it extends to Africa. *Erythræa Roxburghii*, a small plant with pink flowers, belonging to a genus which is

widely scattered over the temperate and sub-tropical regions of the globe, occurs in the Deccan. Four or five species of the tropical genus *Canscora* are found in the South Konkan. The most frequent of these, *C. diffusa*, is also an Australian plant. Three of *Swertia*, a mountain genus, are pretty common on the higher Gháts. *S. multiflora* is an excellent bitter tonic. The well-known "Chirata" of the bázárs, for which the preceding is the Bombay substitute, is *S. chirata*, a native of the Himálayás. *Limnanthemum*, a widely distributed tropical genus of aquatic plants, has three or four indigenous representatives on this side of India. *L. Indicum* is very abundant in the Konkan tanks, and is extensively diffused throughout the rivers and lakes of the tropics. It has pretty white flowers, and its round floating leaves are often mistaken for those of the Water Lily.

Hydrola Zeylanica is the only member of the little order HYDROPHYLLACEÆ which is indigenous to Western India. It is a small creeping plant, with deep blue flowers, found nearly everywhere in wet situations. A species of *Wigandia*, belonging to this order and a native of tropical America, has recently been introduced at Poona. It has enormous leaves. The little *Nemophila* of Bombay gardens is also one of this family.

BORAGINEÆ.—This large order is distributed to all tropical and temperate regions. The genus *Cordia*, of which we have at least three indigenous representatives in Western India, is widely dispersed through the tropics. *C. Myxa*, a handsome tree, may be seen everywhere; it extends from this country into Persia, Arabia, Egypt, the Indian Archipelago, and Australia. *C. Rothii*, also a tree, is nearly as common, and *C. Wallichii* is found in parts of the Deccan. *C. Sebestena*, a small South American tree, with showy red flowers, is frequent in gardens in Bombay. *Ehretia lævis*, our only native species of a widely spread tropical genus, is a Konkan tree. *Coldenia procumbens* is a common weed in rice fields, and, with the preceding, is also indigenous to Australia. *Rhabdia viminea* is a shrub of the Konkan river beds. *Tournfortia subulata*, a member of a cosmopolitan tropical genus of shrubs, occurs in Káthiáwár and Cutch. Seven or eight species of another cosmopolitan genus, *Heliotropium*, are indigenous to this part of India. They are all herbaceous plants and are found mostly in dry situations. Two of them, *H. Indicum* and *H. ovalifolium*, grow in all parts of the tropics. The common sweet-scented Heliotrope of gardens is *H. Peruvianum*, a native of South America. *Trichodesma Indicum* and *T. Zeylanicum*, rough herbaceous plants with pale blue flowers, are very common weeds in nearly every part of the Presidency during the rainy season. Both species extend to tropical Africa and Mauritius, and the latter, in addition, to Australia. Two or three species of *Paracaryum*, also herbaceous plants with blue flowers, abound in the jungles of the higher Gháts; they occasionally occur, too, in the Konkan. *P. cœlestinum* is a familiar Mátherán plant. *Sericostoma pauciflorum* is a small shrubby species of the sandy districts of Gujarát and Káthiáwár. The prickly Comfrey, *Symphytum asperrimum*, which has of late years been extensively brought into notice as a fodder plant, belongs to this order. It has been recently introduced into Bombay, but, so far as we can at present judge, the climate does not seem to agree with it.

CONVOLVULACEÆ form a large family of twining plants chiefly inhabiting the tropics, to all parts of which they are distributed; while in temperate regions they are comparatively infrequent. A large number of species exist in India, and of these about forty-five are contained in the Bombay flora. These are mostly found in the Konkan, on the Gháts, and in the forest districts elsewhere; others prefer the seacoast. The great

tangled masses of vegetation formed in the Konkan during the rainy season are composed principally of these plants. Many of our genera are extensively diffused, spreading from Asia to Africa, Australia, and America. Several individual species, too, have a very wide range. *Erycibe* and *Rivea* possess two representatives each in Western India, and *Argyrea* five or six; the first spreads to Australia and the third to Africa. *A. speciosa* is the well-known Elephant creeper; it grows in most of the forest districts. *Lettsomia*, a small Indian genus, furnishes two species. Of the great cosmopolitan genus *Ipomœa* we have between twenty-five and thirty indigenous species, the majority of which are Konkan and Ghát climbers; some, however, occur in the Deccan, Gujarát, Káthiáwár, and Cutch. *I. speciosa* is the beautiful Moonflower. *I. reptans* is aquatic and is very common in the Konkan and Gujarát tanks. *I. pes-capræ* abounds in sandy ground near the sea. Both the latter species are widely diffused through the tropics. The roots of *I. turpethum* and *I. paniculata*, also Australian plants, are used in native medicine. The seeds of *I. Nil* are a valuable substitute for Jalap, which itself is the product of an American member of this genus. A large number of the species possess showy flowers, and many, both indigenous and naturalized, are cultivated for that reason in Bombay and Deccan gardens. *I. Quamoclit*, a native of Bengal, is an abundant climber here, and may be recognised by its profusion of bright scarlet flowers. The tuber of *I. batatas*, an American species, is the well-known Sweet Potato. The Small Bindweed, *Convolvulus arvensis*, also a British plant, is met with everywhere, particularly in Gujarát and the Deccan. Other genera of this order, all widely diffused, and represented in the Bombay flora by a single species each, are *Hewittia*, *Evolvulus*, *Porana*, *Brewesia*, and *Cressa*. The second is an exceedingly common plant of grass lands in every part of the Presidency. *Porana racemosa* spreads over the highest trees on the Gháts. *P. volubilis*, a native of the Indian Archipelago, is one of our most beautiful garden climbers. *Cressa cretica*, the only representative of the genus and cosmopolitan in the tropics, is a small hairy plant very abundant in salt land in the Konkan. It covers the Byculla flats during the dry season. Two or three species of *Cuscuta*, or Dodder, are parasitic on various plants throughout the Presidency. The commonest of these, *C. Chinensis*, is found everywhere in tropical Asia and extends to Madagascar and Australia. *Jacquemontia violacea*, a native of America, is now a common climber in Bombay gardens; its pretty blue flowers are well known.

SOLANACEÆ.—Two products of this order, Tobacco and the Potato, cause it to be classed as one of the most important in the vegetable kingdom. The species abound most in tropical countries, especially in parts of America. *Solanum*, a large genus of upwards of 700 members, is diffused through all the hottest parts of the world, America more particularly, but is rare in temperate climates. About twenty-five species only are known in India, of which six or seven occur on this side. *S. Indicum* is a very common prickly shrub with yellow berries. *S. diffusum*, a low spreading plant covered with prickles and bearing violet flowers and yellow fruit, abounds in the drier districts. *S. trilobatum* is a prickly climber frequent in Gujarát. *S. giganteum* is a very common shrub on the higher Gháts. *S. nigrum*, a doubtful native however, is a weed often found in gardens; it seems to be a plant of cultivation everywhere in the tropics. Another weed of the same nature is *S. sanctum*; this may be seen occasionally in parts of the Konkan and the Deccan. *S. auriculatum*? a cosmopolitan tropical plant, is a tall bush with pale blue or white flowers, found in the southern parts of the Presidency. We possess also five or six naturalised species of this genus. *S. tuberosum*, a native of South America, is the Potato. *S. melongena* is the common Egg-plant or "Brinjal." *S. macrophyllum*, another South

American species, is a middle-sized tree sometimes found in gardens. *S. jasminoides*, from the same part of the world, is a pretty climber with white flowers. *Withania somnifera* is an abundant weed in many parts of Western India; it is a widely spread plant, and is found in Persia, the South of Europe, and at the Cape. *Lycium Europæum*, a thorny shrub with white flowers and yellow or red berries, is common in Cutch, and is also indigenous to the Mediterranean region. The genus is principally distributed to the Cape and South America. The well-known narcotic *Datura alba* is found everywhere, and *D. fastuosa*, a species with white and purple flowers, is almost equally common. The first appears to differ but little from *D. stramonium*, the common Thorn-apple of Europe. *D. candida*, a large shrubby plant, and a native of Peru, is very common at Mahábaleshvar; its great white bell-shaped flowers make it a conspicuous object. Besides the naturalised species of this family already mentioned, we have several others, many of them of very great importance. *Lycopersicum esculentum*, a native of South America, is the common Tomato. *L. Galeni* is the Cherry Tomato. *Physalis Peruviana*, originally from Peru, is well known here as the Cape Gooseberry. The various species of *Capsicum*, so extensively cultivated as condiments, are generally supposed to have been first brought from South America, from whence they have been distributed over the world. The best known of our Bombay species and varieties of this genus are *C. baccatum*, the Bird Pepper; *C. frutescens* and *C. fastigiatum*, the common Chilly or Cayenne Pepper; and *C. grossum*, the Bell Pepper. The variety called *C. Nepalensis* is the Nepal Pepper. The Henbane, *Hyoscyamus niger*, is cultivated at Ganesh Khind for the Medical Stores. *H. insanus*, the seeds of which are sold in the Bombay bázár, is a native of Beluchistan. The Gujarát Tobacco is yielded by *Nicotiana tabacum*, a native of tropical America; many of the American tobaccos are also the produce of this plant. Shiraz tobacco is obtained from *N. Persica*. Several of the Indian tobaccos, together with Manila and Turkish, are from *N. rustica*. Numerous varieties of a species of *Petunia*, which, like many of those just mentioned, is originally from South America, are now established as the most ornamental of our garden annuals. *Brunfelsia nitida*, an elegant West Indian shrub belonging to this order, is also not uncommon.

Scrophularineæ.—This large natural family is widely diffused over nearly all parts of the globe, but is most abundant in temperate regions. A considerable number occur in the mountainous districts of India, while they are also pretty common in the plains. In Western India about forty species are indigenous, and these are to be found most frequently in the Konkan and on the Gháts; they are all herbaceous, and none of them are of any particular importance. The prevailing genera are tropical. Of *Celsia*, *Linaria*, *Sutera*, *Mazus*, *Lindenbergia*, and *Stemodia* we have one indigenous species each, those of the first two occurring in the Deccan and drier districts, the third in Gujarát, and the rest in the Konkan. All these genera are very widely distributed to both tropical and temperate regions. Six or seven species of *Limnophila*, chiefly aquatic plants, are found near tanks; one of them, *L. gratioloides*, extends to Africa and Australia. *Herpestis Monniera*, another common aquatic plant of the Konkan and Gujarát, and a member of an American genus, is cosmopolitan in the tropics. A second indigenous species occurs in the South Konkan. *Dopatrium* and *Artanema*, both small tropical genera of the Old World, are each represented here by a single species. Of *Torenia* and *Vandelia*, cosmopolitan tropical genera, we possess three or four representatives apiece, all of which are Konkan plants. *T. cordifolia* occurs also in Mauritius; and *T. bicolor*, a pretty climber, is occasionally seen in Bombay

gardens. *V. crustacea*, very common here, is found in every part of the tropics. *Ilysanthes hyssopoides*, an abundant weed in the rainy season, belongs to a small genus extensively diffused through the temperate parts of both Old and New Worlds. Five or six species of *Bonnaya*, and an equal number of *Striga*, small genera of the Asiatic and African tropics, occur in the Konkan, two or three of the latter spreading to the Deccan. *Glossostigma*, *Buchnera*, *Ramphicarpa*, *Oetranthera*, and *Sophubia* are all small tropical genera, and are represented in our flora by one species each. The indigenous member of the last genus, *S. delphinifolia*, is a very handsome plant. Amongst the naturalised ornamental plants of this family to be found in Bombay gardens may be mentioned *Angelonia lobanifolia*, a small shrubby plant with spotted purple flowers, and the common Snapdragon, a species of *Antirrhinum*. Two or three kinds of *Maurandia*, elegant climbers from Mexico, are frequent. *M. scandens* abounds in Mahábaleshvar gardens. *Russelia juncea* and *R. floribunda*, handsome perennials with scarlet flowers, are also natives of Mexico.

Orobanchaceæ are parasitical plants found growing on the roots of other species, and are devoid of regular leaves. *Æginetia Indica* exists in most parts of India and is parasitic on the roots of various kinds of shrubs in the Konkan and Ghát jungles. *Christisonia Stocksii* and *C. Lowii* are found in the same situations as the last. *Phelipæa Indica* occurs frequently on the roots of Tobacco plants. *Cistandra lutea*, a large species with yellow flowers, grows in Káthiáwár on the roots of grasses and of *Calatropis procera.*

Lentibulariæ.—Seven or eight species of the large cosmopolitan genus *Utricularia* are indigenous to this part of India. They are small plants, appearing in the rainy season, and delighting in moist localities in the Konkan. Their flowers are usually blue or purple and rather showy. *U. stellaris*, a widely diffused tropical species, with yellow flowers, grows in tanks near Bombay, and also in Gujarát.

Gesneraceæ.—Four genera of this family—*Æschynanthus*, *Epithema*, *Klugia*, and *Didymocarpus*—are represented in the Bombay flora by one species each. They are herbaceous plants found on the Southern Gháts. The greater part of the order is exclusively South American. Species of the Brazilian genera *Gloxinia*, *Achimenes*, and *Gesnera* are common ornamental flowering plants of Bombay gardens.

Bignoniaceæ.—This order, noted for the beauty of its flowers, is diffused throughout all the warmer parts of the globe. They abound in tropical America, and are also pretty common in India and Africa; a few are found in Australia. At least eight species, all trees, are indigenous to this Presidency. *Oroxylum Indicum*, the sole representative of the genus, is a small fast-growing tree, with fœtid dark-coloured flowers and pods of enormous size, common in nearly all the forest districts of Western India. *Tecoma undulata*, a small tree with drooping branches and a profusion of large orange flowers, is frequent near villages in Western Khándesh and in Gujarát, less so in Cutch. It has usually the appearance of having been planted. *T. stans*, an American shrub with showy yellow flowers, *T. capensis*, a red-flowered shrub from South Africa, and *T. jasminoides*, a splendid Australian climber, are all common in our Bombay gardens. Two species of *Dolichandrone*, a small genus widely diffused through the Old World tropics, occur on this side of India. *D. falcata* and *D. crispa*, small trees with fragrant white flowers, occur in the South Konkan and in parts of the Deccan; the first may also be seen in the Khándesh jungles. *Hetero-phragma Roxburghii*, the well-known "Warus," is a very abundant tree

along the Gháts; it is common, too, in the Sátpuda and Gujarát forests. *Stereospermum xylocarpum*, *S. suaveolens*, and *S. chelonoides* are found in the Ghát forests, the first ranging from the Dángs to Kánara; the second also occurs in the latter districts and in the Southern Marátha Country. Several handsome exotic climbers belonging to this order abound in Bombay. Amongst these may be mentioned *Bignonia venusta*, *B. radicans*, *B. unguis*, *B. æquinoctialis*, and *B. gracilis*, with two or three others of the same genus, all from tropical America. *Millingtonia hortensis*, a tall elegant tree with fragrant white flowers, a native of Burma and the Indian Archipelago, is now common in the neighbourhood of Poona, where it grows to perfection; it makes a splendid roadside tree. Belonging also to this family we have in Bombay *Parmentiera cerifera*, the Candle-tree of tropical South America; with *Crescentia Cujete*, the Calabash tree, and *C. alata*, both from the same region. *Kigelia pinnata*, a native of Madagascar, is now a not uncommon tree close to Bombay. Its large cylindrical woody fruit, hanging from long slender stalks, give it a strange appearance.

PEDALINEÆ.—Two indigenous species of this little order are found in Western India. *Pedalium murex*, an annual plant with yellow flowers and spiny fruit, occurs in the Deccan and in Káthiáwár and Cutch. *Sesamum Indicum*, a well-known plant, is cultivated in many parts of the Presidency, particularly in Khándesh. Its seeds are the "Til" seeds from which gingelly oil is expressed. It is cultivated also in Africa and America. *Martynia diandra*, another plant of this order and a native of tropical America, is now a common roadside weed about Bombay. It bears showy purple flowers and curious hooked fruits.

ACANTHACEÆ.—Except for its numbers, and certain botanical affinities regarding this country which its distribution indicates, this large tropical family of shrubs and herbs possesses but a small share of interest. Its genera are diffused throughout the equinoctial regions of both Old and New Worlds, a few species extending into Europe and North America, and southwards to the Cape and Australia. One striking circumstance connected with their distribution is, that nearly all the genera found in the mountainous parts of western tropical Africa are represented also in India, several of them in this Presidency. The spinous *Acanthaceæ*, which in this country are chiefly confined to the northern and western regions, are largely represented in the floras of Arabia and Northern and Eastern Africa. Various genera, too, are common both to Western India and the Cape. Hardly more than three of those in our flora are exclusively Indian; all the rest possess African, and a few American and Australian representatives. India is rich in species of this order. Between eighty and ninety, belonging to more than thirty genera, are contained in the Bombay flora. These are distributed principally to the Konkan and Gháts and to the other forest districts. The shrubby species form often the greater portion of the forest undergrowth, in many cases to the exclusion of everything else. Amongst the chief indigenous genera of Western India may be mentioned *Thunbergia*, *Ebermeira*, *Hygrophila*, *Ruellia*, *Dædalacanthus*, *Strobilanthes*, *Blepharis*, *Acanthus*, *Barleria*, *Neuracanthus*, *Asystasia*, *Eranthemum*, *Andrographis*, *Phlogacanthus*, *Lepidagathis*, *Justicia*, *Adhatoda*, *Rungia*, *Dicliptera*, *Peristrophe*, and *Hypœstes*. Of the first genus *Thunbergia fragrans*, a pretty Konkan climber with white flowers, and *T. Mysorensis*, an extensive climber with red or orange flowers, are often kept in gardens. *T. grandiflora*, another immense climber with large pale blue flowers, a native of Bengal, is also common here, as well as a fourth species, *T. alata*, from Madagascar. *Nelsonia campestris*, the sole member of the genus, is a common weed of the Konkan and Gujarát; it spreads through nearly all the tropical regions

of the world. *Hygrophila longifolia* is very abundant about Bombay in swampy places, and is plentiful also in Gujarát. Four or five species of the large tropical genus *Ruellia* are also common plants. Two or three varieties of *R. elegans* are cultivated in gardens. Of *Strobilanthes*, another large tropical genus, mostly Asiatic, we have ten or more indigenous species, many of which bear showy flowers. *S. asperrimus* forms a considerable portion of the forest undergrowth and jungle on the Gháts opposite Bombay. *S. elegans*, from Bengal, may frequently be seen in gardens. *Acanthus ilicifolius*, a spiny plant with blue flowers, and leaves exactly resembling those of the Holly, abounds in the salt marshes along the coast; it is indigenous also to Java and Australia. Several species of *Barleria*, a widely spread tropical genus, occur on the Gháts. *B. cristata* and *B. grandiflora* bear showy flowers and are often met with in gardens. *B. prionitis*, a spiny shrub with orange flowers, is perhaps the commonest plant in the Presidency, in every part of which it is found. *Neuracanthus sphærostachyus* exists in great abundance in the Konkan. *Andrographis paniculata* is the common "Kreat" of the bázár and is used as a substitute for Gentian. Several species of *Lepidagathis* are Konkan weeds; the genus is also represented in Africa and America. Seven or eight members of the large, widely diffused, tropical genus *Justicia* are indigenous. *J. procumbens*, a common weed, spreads to Africa and Australia. *J. gendarussa*, a native of the Indian Archipelago, is much employed here as an edging for flower beds, and is known to Europeans as "Tea border." Two or three species of *Adhatoda* are Ghát and Konkan shrubs. *A. vasica*, common on the Gháts and in Gujarát, spreads through tropical Asia and Africa. *A. cydoniæfolia*, a Brazilian plant with beautiful violet flowers, is found often in Bombay gardens. The solitary species of which the genus *Ecbolium* consists, is common throughout the Konkan; it is also indigenous to tropical Africa. *Dicliptera*, of which we possess about four species, is diffused everywhere through the tropics, and spreads also to Australia and Polynesia. *Peristrophe* and *Hypœstes* extend to Africa, Madagascar, and Australia. Several exotic species of this order are cultivated here either for their flowers or for their variegated leaves. *Meyenia erecta*, a shrub from Western Africa, has showy blue flowers. Two species of *Aphelandra*, both American plants, bear spikes of handsome red and rose-coloured flowers. The two species which form the Peruvian genus *Fittonia* have recently been introduced; they are elegant foliage plants. *Graptophyllum pictum*, the Caricature plant, indigenous to the Indian Archipelago, is a familiar Bombay shrub. We possess at least four varieties of it.

Verbenaceæ form a large and important natural order, most abundant within the tropics. A few species extend into North America and Europe, and to the Cape and Australia. The arboreous species are exclusively tropical. About twenty members of the order are indigenous to this side of India. Of the American genus *Lantana* we have one native representative, *L. alba*, a small shrub found in various parts of the Deccan. *L. camara*, a straggling shrub with red and orange flowers, from Brazil, is now exceedingly common in the Konkan, aften forming dense jungles, and spreading rapidly when allowed to do so. In Ceylon it has taken entire possession of extensive tracts of country. *Lippia nodiflora*, a cosmopolitan tropical weed belonging to a large American genus, is very common in sandy ground. *L. citriodora*, a native of South America, is the well-known sweet-scented Verbena of gardens. One species of *Priva*, a common weed, is also indigenous. *Callicarpa lanata*, a straggling shrub or small tree with downy leaves and purple flowers, is very abundant along the higher Gháts. The genus extends to Australia and America. *Tectona grandis*, the Teak, occurs in all the forest districts of the Presidency. In Kánara alone, how-

ever, does it attain any considerable size, while in the Ghát, Dáng, Sátpuda, and Gujarát forests it is comparatively small. In parts of the North Konkan a stunted growth of this tree forms extensive jungles. A great part of the vegetation on the Gir hills in Káthiáwár is said to be composed of Teak. Three or four species of *Premna*, a widely diffused tropical genus of shrubs and trees, are frequent in the Konkan and Ghát jungles. *P. scandens* is one of the commonest of Mátherán climbers. *Gmelina arborea*, a useful timber tree, is plentiful in both Konkans and in Eastern Gujarát. Of the cosmopolitan genus *Vitex* we possess four or five indigenous species. *V. negundo* is an exceedingly abundant shrub in nearly every part of the Presidency, more especially in the black soil of the Deccan and Khándesh. *V. leucoxylon* is a common tree in the South Konkan and about Bombay, and *V. altissima* is an important timber tree of the Kánarese forests. We have at least four indigenous representatives of *Clerodendron*, an extensive tropical genus of shrubs and trees, many of which are cultivated on account of their showy flowers. *C. phlomoides*, a tall white-flowered shrub, is common in the Deccan and Gujarát. *C. infortunatum* abounds in parts of the South Konkan as a forest undershrub; it is also cultivated in gardens. *C. inerme*, a straggling shrub with white flowers, is found everywhere near the sea. Like many other sea-coast plants, it has a wide distribution. *C. serratum* is a Konkan shrub with blue flowers. Amongst the introduced species of this genus to be seen in Bombay gardens we have *C. siphonanthus*, a native of Bengal; *C. fragrans*, a Chinese shrub with showy rose-coloured flowers; and *C. aculeatum*, from the West Indies. *C. nutans*, said to be a native of Madagascar, is one of our most elegant flowering shrubs. *C. Thomsoni* and *C. speciosum*, from Western Africa, and *C. squamatum*, a native of China, are also very ornamental flowering shrubs. *Symphorema involucratum* is a South Konkan climber. *Avicennia officinalis*, a shrub or small tree, is common in salt marshes along the coast; it is found on the tropical shores of both Old and New Worlds. Besides those already noticed there are various other exotic species of this order naturalised in Bombay. *Stachytarpheta urticæfolia* and *S. mutabilis*, from tropical America, the one with blue and the other with rose-coloured flowers, are both very common herbaceous plants. Three or four species of *Verbena*, chiefly American, are cultivated for their showy flowers. *Petrea volubilis*, from South America, is a well-known climbing shrub with blue flowers. *Duranta Ellisii* and *D. Plumieri*, handsome flowering shrubs, also from tropical America, are found in every garden. *Holmskioldia sanguinea*, a Himálayan shrub with scarlet flowers, is likewise not uncommon.

LABIATÆ.—The greater number of species belonging to this large and important order are found in the temperate regions of the Old World. A considerable proportion are, however, distributed to the tropics. In this country several genera prevail in the plains and warmer districts, and these, more especially, display African and Australian affinities. The genera which are most common in the Himálayás show on the contrary affinities to the vegetation of very different regions. The Bombay flora contains about fifty species, and, with one exception, these are all herbaceous plants, many of them appearing only during the rainy season. They are chiefly distributed to the Konkan and Ghát districts. Amongst our principal indigenous genera may be mentioned the widely spread genus *Ocimum*, of which at least three species out of the five or six found here occur also in Africa. *O. canum*, *O. basilicum*, and *O. gratissimum* are all common. *O. sanctum* is the well-known sacred "Tulsi." *Moschosma*, *Acrocephalus*, *Orthosiphon*, and *Plectranthus*, all African genera, have each one or two representatives in Western India. *M. polystachyum*, of the first,

is the cultivated Mint-basil; it occurs wild in the Konkan and extends to Africa and Australia. *P. rotundifolius*, of the last, is a creeping Konkan plant, and is also widely distributed elsewhere in the tropics. *Coleus barbatus*, indigenous to the Deccan, extends to Arabia. *C. aromaticus* is the so-called "Borage" of Bombay gardens. Several introduced species and varieties of this genus are cultivated here for their ornamental foliage. Two species of *Lavandula* are Deccan plants; they may also be seen in gardens, together with *L. vera*, the common Lavender, a British plant. The genus is further distributed to South Europe, Egypt, Arabia, and Persia. Of the Indian genus *Anisochilus* we possess three or four indigenous species, and of *Pogostemon* and *Dysophylla*, also Asiatic genera, six or seven each. Nearly all are Ghát and Konkan plants. *Pogostemon purpuricaulis* grows in great abundance, as forest undergrowth, on the higher Gháts. Its leaves have a strong odour of black currants. *P. Patchouli*, a native of the Eastern Archipelago, is the cultivated "Pách." *Colebrookia ternifolia* is a very common shrub, especially on the Deccan side of the Gháts. One aromatic species of the cosmopolitan genus *Micromesia* grows in wet places on the higher Gháts. *Salvia plebeia*, also an Australian plant, is our only indigenous representative of a genus numbering 450 species. *S. coccinia*, a native of America, is cultivated in Bombay gardens, and so is *S. officinalis*, the common Sage. Of *Nepeta* and *Scutellaria*, large genera belonging to temperate regions, we possess also but a single representative each. *Anisomeles*, a small but widely diffused genus of the Old World tropics, gives us three or four species. Of *Leucas*, a genus distributed to nearly all parts of the tropics, we have ten or twelve indigenous species. *L. aspera*, a Konkan plant, spreads to Africa. *L. cephalotes*, *L. linifolia*, and *L. urticæfolia* are found in Gujarát, Káthiáwár, and Cutch. *Leonotis nepetæfolia*, with orange and red flowers, is a common plant about Bombay and in parts of the Deccan. It is a doubtful native, however, and has probably been introduced from Africa, where it is certainly indigenous. In addition to those previously mentioned there are a few other exotic species of this family cultivated in Western India, either as ornamental plants or for their aromatic properties. Amongst these are *Mentha arvensis*, the common Mint; *Origanum Majorana*, the Marjoram; and *Thymus vulgaris*, the Thyme. *Rosmarinus officinalis*, the Rosemary, is occasionally seen in Deccan gardens.

NYCTAGINEÆ is a small order widely diffused through the warmer regions of the globe. Our only indigenous representatives are five or six species of the cosmopolitan tropical genus *Boerhaavia*. These are small plants found chiefly in the Deccan and Gujarát. *B. diffusa* and *B. repanda* occur in the Konkan, the first especially being one of the commonest weeds. Both are spread over the whole of India and extend also to Africa and Australia. *B. repens*, too, has a wide distribution. *Pisonia morindifolia*, the familiar Lettuce-tree, a native of Java; three species of *Bougainvillea*, indigenous to Brazil; and *Mirabilis jalapa*, the Marvel of Peru, belong to this order. They are all too well known in Bombay gardens to need further notice.

POLYGONACEÆ is a considerable order, dispersed over every part of the world. They inhabit chiefly, however, the north temperate zone, are much less frequent in the tropics, and are comparatively rare in southern regions. The Bombay flora possesses but six or seven species. Two at least of the cosmopolitan genus *Rumex* are indigenous, namely, *R. Wallichii* and *R. dentatus*. Both are found in the Konkan, and the latter in the Deccan. *R. vesicarius*, the Bladder Dock, is cultivated as a potherb in the Deccan. Of the large and equally wide-spread genus *Polygonum* we have about four species. *P. glabrum* and *P. rivulare* are common in the water-courses of

the Deccan and Khándesh, the latter, too, in Gujarát. *P. Chinense* occurs on the higher Gháts, and *P. elegans* in Gujarát and Cutch. *Antigonon leptopus*, a charming American climber lately introduced, as well as *Fagopyrum tataricum*, one of the varieties of Buck-wheat, belong to this order. The first is now common in Bombay gardens and the second is cultivated in the Deccan.

Amarantaceæ.—In the rainy season the herbaceous plants of this cosmopolitan tropical family abound in the plains of India. The Bombay flora contains between twenty and thirty species, some of which are among the most widely distributed weeds of warm countries. *Deeringia celosioides*, *Celosia argentea*, and three or four species of *Amaranthus*, are all common: the first extends to Australia and the second to Africa. *A. paniculatus* is cultivated in the Deccan for its seeds. *A. tristis* and *A. spinosus* are cosmopolitan tropical weeds, and are much used here as potherbs. *A. salicifolius*, from the Philippines, together with other species and varieties, all with brilliant crimson or deep purple foliage, are well-known ornamental plants of Bombay gardens. *Amblogyne polygonoides*, *Mengea tenuifolia*, and *Euxolus oleraceus* are also common indigenous potherbs. *Psilotrichum sericeum* is an abundant weed during the rains. Several species of the widely distributed genus *Aerva* are natives of Western India. Of these *A. lanata* and *A. brachiata*, both also African plants, are the most frequent. *A. Javanica* and *A. monsonia* occur in Káthiáwár and Cutch. *Achyranthes aspera*, a cosmopolitan tropical species, grows in all parts of the Presidency. *Digera arvensis* is very common, as is also another universally diffused tropical plant *Cyathula prostrata*. *Pupalia atropurpurea* occurs near the coast in Gujarát, Káthiáwár, and Cutch, and spreads to Africa. *Alternanthera sessilis*, a small weed, abounds everywhere; it is also indigenous to tropical Africa and America. *Gomphrena globosa*, the Globe Amaranth, a doubtful native of this country, is common in gardens. A species of *Iresine*, an ornamental plant with deep crimson leaves, is also frequent in Bombay.

Chenopodiaceæ.—This order is found principally in temperate regions, and generally in maritime localities. Of our three or four indigenous species, *Atriplex Stocksii*, a small shrubby plant, occurs in Gujarát. *Salicornia Indica*, *Suæda nudiflora*, and *S. Indica* are all abundant in salt ground near the coast, especially of Gujarát and Káthiáwár. Other plants of these two genera exist in similar situations in many parts of the world. They contain a quantity of saline matter and are burnt for Barilla in all places where they are found in sufficient quantities. The succulent stems of *Salicornia Indica* are often eaten here as a vegetable, and the impure Carbonate of Soda, or "Khár," so much used in Bombay, and brought from Sind and Arabia, is procured by burning the two last-mentioned species. *Chenopodium ambrosioides*, a widely diffused aromatic weed, native of America, is occasionally seen about Bombay. *Beta vulgaris*, the common Beet, a member of this order, is cultivated in Western India.

Myristicaceæ is a small order of which only two species are indigenous to this Presidency—*Myristica attenuata* and *M. Malabarica*. These are lofty trees found on the Gháts and in the Konkan, the latter also in Kánara. They bear fruit like nutmegs, but much less aromatic. *M. moschata*, a native of the Indian Archipelago, is the Nutmeg. In Bombay this tree will grow only near the sea.

Laurineæ is an important order of aromatic shrubs and trees distributed chiefly to tropical regions, more especially those of Asia and America They are very rare in Africa and a few are found in Australia. Not more than ten or twelve are indigenous to Western India, and these, with one

exception, are common Ghát and Konkan trees. Amongst them are two species of *Machilus* and one of *Alseodaphne*. *Beilschmiedia Roxburghiana* and *Cryptocarya floribunda* are both plentiful on the Southern Ghâts. *C. australis*, a Queensland tree, was introduced into Bombay a few years since. *Tetranthera laurifolia* is also a common tree: it extends to Australia. One of the most abundant trees of the higher Ghâts, particularly so at Mahábaleshvar, is *Actinodaphne lanceolata*. Two other indigenous trees are *Cylicodaphne Wightiana* and *Litsæa Zeylanica*: the latter has a wide range, spreading to Australia. *Cassytha filiformis*, a curious parasitic plant of this order and a member of an Australian genus, is cosmopolitan in the tropics. In Western India it is found everywhere, but is commonest in the Deccan, where its yellow thread-like masses may be observed covering the Milk-bush hedges or the Bábul trees. *Laurus nobilis*, the Sweet Bay, a native of South Europe, is sometimes found in Bombay gardens. A few specimens exist, too, of *Cinnamomum Zeylanicum* the true Cinnamon. *C. camphora*, the Camphor tree, has recently been introduced and appears likely to thrive well in this climate. *Persea gratissima*, the Avocado Pear of tropical America, is said to be occasionally seen in Deccan gardens.

THYMELEÆ is a considerable order inhabiting principally the temperate regions of both hemispheres. *Lasiosiphon speciosus*, a small shrub with yellow flowers, is the only species which occurs in the Bombay flora. It is exceedingly common on the Ghát and Konkan hills. The plant is highly poisonous, and a silky fibre may be procured from its bark.

ELÆAGNACEÆ.—Our sole indigenous representative of this little order is *Elæagnus latifolia*, a large woody climber very common along the higher Ghâts. It extends through the Eastern Archipelago to Australia. The genus, which is the principal one of the order, is widely distributed: other species occur in Persia, South Europe, and North America.

URTICEÆ.—Of this large and important order the Bombay flora possesses but an inconsiderable proportion of representatives. The majority of these are trees and the remainder herbaceous plants. *Celtis Roxburghii* and *Trema orientalis*, members of very widely spread genera, are two common Ghát and Konkan trees; the latter is indigenous also to Africa and Australia. *Ulmus integrifolia*, a large timber tree, is found in many parts of India: here it occurs in the Konkan and Kánara, but would seem to be most abundant on the Sátpuda and Western Khándesh hills. Other species of this genus are the Elms of Great Britain. The important genus *Artocarpus* gives us at least three indigenous species. Of these *A. integrifolia*, the common Jack tree, is well-known: it is planted in nearly every part of the Presidency, but is found truly wild only towards the south. *A. hirsuta* and *A. Lakoocha* are Konkan and Ghát trees. *A. incisa*, a native of the Eastern Archipelago and Polynesia, and often seen in Bombay, is the Breadfruit. Of the great cosmopolitan tropical genus *Ficus* we possess sixteen or eighteen indigenous species only. Certain trees of this genus form a characteristic feature of nearly every Indian landscape. The best known in this part of the country—too well-known indeed to require any detailed notice, are *F. Indica*, the Banian; *F. religiosa*, the "Pipal;" *F. retusa*, the "Nandruk;" and *F. glomerata*, the "Umbar." Amongst the others *F. Tsiela*, *F. tomentosa*, *F. cordifolia*, and *F. asperrima* are the commonest. *F. volubile* is a climbing Ghát shrub. The chief of the remaining indigenous species, all of less interest than those just mentioned, are *F. Lambertiana*, *F. infectoria*, *F. benjaminea*, *F. acutiloba*, *F. heterophylla*, and *F. hispida*. The India-rubber tree, *F. elastica*, a native of Assam, has of late years become rather frequent in the vicinity of Bombay.

F. Carica, which is probably a native of Persia, is the cultivated Fig. The best Figs sold in Bombay are grown at Poona. The Australian Banian, *F. macrophylla*, has been recently introduced from Queensland; and *F. eburnea*, from Bengal, is now becoming a common ornamental garden shrub. *Antiaris innoxia* is a large forest tree found along the Gháts and in the Konkan and Kánara. Its fibrous bark removed whole from a section of the trunk forms a natural bag or sack. *A. toxicaria*, the famous Upas tree of Java, was introduced into Bombay a few years ago; and so far the climate appears to agree with it perfectly. *Streblus asper*, a small crooked tree with rough leaves, is very abundant in the Konkan, but somewhat less so in other parts of the Presidency. Two species of *Elatostemma*, herbaceous plants, grow in the Ghát and Konkan jungles. *Debregeasia longifolia*, a large shrub, is common in the same localities, and *D. naucleiflora*, a large woody climber, occurs in the South Konkan. *Bœhmeria scabrella* is a shrubby plant found chiefly in the Konkan. *B. nivea*, the China-grass or Rhea, a native of Assam and the Archipelago, grows luxuriantly in Bombay, where it has been naturalised for many years. Our flora contains also four or five members of the widely spread genus *Pouzolsia*. *P. Indica*, also an Australian plant, with one or two others, are some of the commonest monsoon weeds. Besides the above we have two indigenous species, which may be referred to the cosmopolitan genus *Urtica*, namely, *U. interrupta*, an exceedingly abundant weed during the rainy season, and *U. heterophylla*, a large and formidable stinging nettle found in the dense Ghát jungles towards the south. A strong and useful fibre may be prepared from the latter species. The first stings, too, but slightly, and in appearance closely resembles the common European Nettle, *U. dioica*, which, it may be mentioned, once appeared in Bombay as an introduced weed, but has since vanished. Various species or varieties of Mulberry, belonging to this order, are cultivated in Western India, both for their leaves as food for silkworms and for their fruit. The commonest of these are *Morus alba*, with white or red fruit; and *M. Indica*, *M. nigra*, and *M. atropurpurea*, with dark purple or black fruit. Another plant of this order, the well-known *Cannabis sativa*, the Hemp, is cultivated in the eastern parts of the Deccan and in the Southern Marátha Country.

A single species of the Australian genus *Casuarina* and natural order CASUARINEÆ—*C. equisetifolia*—is indigenous to India; spreading thence from Australia, to which country the rest of the order is confined. It is a large fast-growing timber tree, well known about Bombay, where it is commonly planted. As a firewood and timber tree its merits are decidedly not so well appreciated here as they deserve.

The Willow order, SALICACEÆ, which is distributed chiefly to the temperate and cold regions of the northern hemisphere, has one representative in the Bombay flora. *Salix tetrasperma* is a shrub or small tree found in moist places along the highest Gháts. *S. babylonica*, a native of Persia or Afghanistan, may often be seen in Bombay gardens.

EUPHORBIACEÆ, a great natural order containing upwards of 3,000 species, is distributed to all parts of the world except the coldest regions. It is most abundant within the tropics, especially of America. From four to five hundred species--herbs, shrubs, and trees, occur in India, and many of these are characterised by the possession of acrid milky or watery juice, which in some cases is of a highly poisonous nature. The Bombay flora contains, at the utmost, not more than seventy species. Some of these are very widely distributed, and several of our genera are common to tropical Africa, America, Australia, and Polynesia. The immense genus *Euphorbia*, comprising upwards of 700 species, and dispersed to most parts of the world,

is represented here by twelve or fourteen only. *E. neriifolia*, a spiny cactus-like plant, is the common Milk-bush. It abounds on the Gháts and on the Deccan and Khándesh hills, and is extensively used as a hedge plant all over the Presidency. *E. nivulia*, which much resembles it in appearance, is common in Gujarát, Káthiáwár, and Cutch, and in parts of the Deccan and Khándesh. *E. antiquorum* has the same habit as the preceding two species, but is much less frequent, being found only in the extreme southern districts. *E. acaulis*, a stemless plant with a large root, occurs on the Gháts and Deccan hills; *E. oreophila* on the Gháts and in Gujarát; and *E. thymifolia*, *E. pilulifera*, and *E. parviflora* are common annual weeds seen everywhere. The two first are widely spread through the tropics. *E. Rothiana*, *E. uniflora* and *E. elegans* are Konkan plants. *E. tirucalli*, the Smooth Milk-bush, a native of Brazil, is now a universal hedge plant in the Deccan and Gujarát; and *E. splendens*, a thorny shrub with red flowers, a native of South America, is common in gardens. Two species of *Antidesma*, *A. diandra* and *A. Ghæsembilla*, are small Konkan trees with edible fruits; the latter extends to Australia. *Actephila excelsa* is a Ghát tree, and *Sauropus ceratogynum* a small Konkan shrub. Of the large cosmopolitan genus *Phyllanthus* we possess only ten or twelve of the 450 species which it contains. *P. nitidus*, a large shrub, grows in wet places in the South Konkan. *P. lanceolarius* is one of the most abundant trees of the higher Gháts. *P. reticulatus*, a large climber, occurs all over the Presidency. *P. emblica* is a well-known Ghát tree with edible fruit. *P. polyphyllus*, *P. Lawii*, *P. maderaspatanus*, and *P. simplex* are Konkan shrubs and herbs: the two latter spread to Australia and the last mentioned also to Africa. *P. Niruri* is an exceedingly common weed everywhere during the rains, and is distributed to nearly every part of the tropics. *P. Indicus* is a tree of the Southern Gháts. *P. distichus*, from the Eastern Archipelago, is a common garden tree, and its acid fruit, called by Europeans "Country Gooseberry," is eaten. *P. epiphyllanthus* is a curious West Indian shrub occasionally seen in Bombay gardens. Abundant in the Konkan jungles are *Melanthesopsis patens* and *Putranjiva Roxburghii*, both trees; with *Securinega obovata* and *S. leucopyrus*, shrubs. The first is equally abundant in Eastern Gujarát. The two latter are also indigenous to Australia. *Aporosa Lindleyana* and *Bischoffia Javanica*, with two species of *Hemicyclea*, are trees of the Southern Gháts and Konkan. *Briedelia montana* is a very common tree at Máthérán and along the Gháts, and quite as abundant in the Konkan is *B. stipularis*, a climbing shrub. Of the immense and widely diffused tropical genus *Croton* we have about six indigenous species—mostly Konkan trees: two of these, *C. reticulatus* and *C. oblongifolius*, are rather handsome trees. One species occurs in the Deccan. The familiar "Laurel" of Bombay gardens, a shrub with green and yellow leaves, is *C. variegatum*, a native of the Indian Archipelago. Numerous other species and varieties of the same genus have of late years been introduced here as ornamental plants. *Agrostistachys Indica* is a shrub of the Southern Gháts, and *Crozophora plicata* an annual plant of the Deccan and Gujarát. *Acalypha Indica*, an abundant weed of the rainy season, is our single representative of a considerable and widely dispersed tropical genus. *A. Wilksiana* is an ornamental shrub, with scarlet and brown leaves, from the Fiji Islands: introduced into Bombay only a few years ago, it has since spread all over Western India. *Tragia involucrata*, belonging to a cosmopolitan tropical genus, is a common Ghát twiner; its leaves sting like a nettle. *Trewia nudiflora* is a handsome Konkan tree. Five or six species of *Mallotus*, another widely distributed genus of trees and shrubs, are indigenous: they all occur along the Gháts and in the Konkan and Kánara. The commonest and best known of them is *M. Philippensis*, which is also found in

Australia. The red powder with which its fruit is covered is used as a dye and as a vermifuge. *Macaranga peltata*, a tree, abounds on the Gháts. Two species of *Homonoya* and two or three of *Jatropha* are Deccan shrubs: they are plentiful in water-courses. Of the latter genus we possess three naturalised American species.—*J. curcas*, the Physic nut, is common everywhere and is largely used as a hedge plant. The others are *J. multifida*, the French Physic nut, and *J. gossipyfolium*. *Givotia Rottleriformis* is a small Deccan tree, and *Baliosvermum montanum* a Konkan and Gujarát perennial. *Sebastiana chamelea*, another Konkan weed, spreads to Australia and tropical Africa. Two species of the cosmopolitan tropical genus, *Excœcaria*, *E. Agallocha* and *E. insignis*, are indigenous trees containing poisonous milky juice: the one occurs in salt marshes along the coast, and extends to Australia, and the other is a rather infrequent Ghát tree. *E. sebifera*, the Chinese Wax-tree, is occasionally seen here in gardens. Amongst our remaining naturalised plants of this order may be mentioned *Pedilanthus tithymaloides*, a little West Indian shrub much used as a border plant. *Poinsettia pulcherrima*, a Mexican shrub, is, with its bright scarlet bracts, a conspicuous object in Bombay gardens during the cold season. *Aleurites Moluccana*, a native of Australia and the Pacific Islands, is a handsome tree often planted near Konkan and Deccan villages. Europeans know it as the Bengal Walnut: the kernel of its fruit is eatable and resembles somewhat the English Walnut. *Ricinus communis*, the Castor-oil plant, is familiar to all. The Cassava or Tapioca, *Manihot utilissima*, a South American shrub, is frequently seen in Bombay. Although it flourishes in this climate, it seems strange that its systematic cultivation has not as yet been undertaken.

Aristolochiaceæ is a small tropical order, distributed principally to Asia, South America, and Australia. *Bragantia Wallichii* is a shrubby plant found in the South Konkan and common in Kánara. *Aristolochia acuminata*, belonging to a large cosmopolitan tropical genus, is a Konkan climber. *A. Indica* is sparingly scattered over most districts of the Presidency, and extends to Australia. *A. bracteata* grows in the Deccan, Gujarát, and Cutch, and about Bombay. *A. ringens* and *A. ornithocephala*, natives of Brazil, are common climbers in our gardens. The strangely shaped, mottled, evil-smelling flowers of the latter are well known.

Loranthaceæ, the Mistletoe order, are all parasitic plants and are most abundant in tropical countries. Ten or twelve species of *Loranthus* occur on trees in the Bombay forest districts. The commonest of these, and found in nearly all parts of the Presidency, is *L. longiflorus*: it grows chiefly on Mango trees and, if not stripped off in time, eventually destroys them. About Bombay, however, many other trees, particularly the two kinds of silk-cotton trees, are subject to its depredations. This species extends to Australia. The remaining indigenous plans of the genus occur principally on Ghát trees, but may also be found in Khándesh and Gujarát. Besides the above, the Bombay flora possesses two species of the widely-spread genus *Viscum*. Both of these—*V. angulatum* and *V. attenuatum*—grow on Konkan and Ghát trees. The first spreads to Australia, but the second is by far the commonest in Western India. The Mistletoe, *V. album*, a well-known British plant, is found also on the Himálayás.

Santalaceæ.— *Santalum album*, the Sandal-wood, is a small tree indigenus to the Southern Deccan districts, but planted about Poona and in other parts of the Presidency. Several Australian and Polynesian species of this genus also yield Sandal-wood. *Sphærocarya leprosa* is a small tree of the South Konkan, and *Osyris arborea*, a shrub, is common on the Gháts.

Piperaceæ, the Pepper order, consisting almost entirely of two large genera, range very widely through the tropics. Of the genus *Piper*, containing upwards of 600 species, we have only two representatives. *P. sylvestre* and *P. Hookeri*, climbing plants rooting at the joints, are abundant on rocks and trees along the higher Gháts. *P. nigrum*, the Black Pepper; *P. cubeba*, the Cubeb; *P. longum*, the Long Pepper; and the familiar *P. Betle*, the "Pán," are all to be found in Bombay gardens. The Black Pepper is largely cultivated in the South Konkan. *Peperomia portulacoides*, a member of another immense cosmopolitan tropical genus, is a creeping plant occurring on rocks and trees of the South Konkan and Kánara.

The small cosmopolitan aquatic orders Ceratophylleæ and Podostemaceæ are both represented in the Bombay flora. The first consists of a single species only, *Ceratophyllum demersum*, which is common in tanks: it is found in most parts of the world. Of the second order we have five or six species of *Terniola* and one of *Podostemon*—*P. Hookerianus*—all of which are minute plants of the Konkan streams.

Gnetaceæ, another small but widely distributed order, is represented in Western India by a climbing shrub, *Gnetum scandens*. This is plentiful in the denser Ghát jungles, and spreads to the Eastern Archipelago and China. The genus itself extends to tropical America.

Although we possess no indigenous species of the large and important order Coniferæ, there are yet several exotic trees and shrubs belonging to it, and now more or less common in Bombay, which deserve mention. Amongst these are *Araucaria excelsa* and *A. Cookii*, the Norfolk Island Pines; and *A. Cunninghami* and *A. Bidwilli*, the Moreton Bay Pines. All these have been introduced from Australia within the last twelve or fifteen years, but that they will ever become thoroughly naturalised in this part of India is doubtful. A few species of *Juniperus* and *Cupressus* are also pretty common. *C. sempervirens*, the Cypress, flourishes at Poona, and *C. glauca* is frequent in Bombay gardens. The Arbor-vitæ, *Thuja orientalis*, a Chinese tree, grows well in Bombay. *Podocarpus elongata*, a tree from the Cape, is occasionally seen here. Of Cycadeæ, an order closely allied to the preceding, we possess also but a few exotic species. One of these, very frequently met with about Bombay, is *Cycas circinalis*, a native of Southern India and Ceylon. Europeans call it the "Sago Palm," doubtless from its palm-like habit of growth and from the fact that a starchy substance resembling sago may be obtained from its trunk. The true Sago Palm, *Sagus lævis*, is, however, a member of the natural order *Palmæ*. *C. revoluta*, a Japanese plant, is smaller than the first mentioned, and is less common here. *Encephalartos horridus*, an ornamental species of this order and a native of South Africa, may be found in a few Bombay gardens. It is a plant of extremely slow growth.

In the class Monocotyledons are included the following indigenous natural orders:—

The first on the list is Hydrocharideæ, an inconsiderable but widely diffused order of small aquatic herbs. Three or four species are found in tanks throughout Western India. Two of these, *Ottelia alismoides* and *Hydrilla verticillata*, are also Australian plants. The latter is the most abundant of all our aquatic weeds. A third species is *Vallisneria alternifolia*. A fourth, *V. spiralis*, is cosmopolitan.

Scitamineæ.—Of this large tropical family we possess between twenty and thirty indigenous representatives, which are almost exclusively distributed to the moist forest districts. Two species of the important genus

Musa, *M. ornata*, and *M. superba*, the well-known wild Plantains, are very abundant along the Gháts. The first is found chiefly on the Southern Gháts and in Kánara, and the second is common throughout the whole range. The cultivated Plantain, of which we have numerous varieties, is *M. paradisiaca*. *M. coccinia*, a native of China, is common in Bombay gardens and may be recognised by its head or brilliant scarlet bracts. *M. zebrina* and *vittata*, American species, together with *M. Africana*, from tropical Africa, were introduced a few years ago and may now often be seen in gardens. *Globba marantioides*, with fragrant yellow flowers, is found in the South Konkan. Five or six species of *Zingiber* are common in the Konkan and Ghát jungles. They have generally showy pink and yellow flowers. Ginger is the root-stock of *Z. officinale*, a plant much cultivated in Western India. *Hedychium scaposum* occurs near rivers in the South Konkan and Kánara. *H. flavum*, a native of Bengal, is a handsome plant occasionally found in gardens. The important Asiatic genus *Curcuma* gives us seven or eight indigenous species. *C. angustifolia* with yellow, and *C. decipiens* with purple flowers, occur in the South Konkan. *C. zedoaria*, another Konkan plant, has large rose-coloured bracts. Its rhizome is one of the varieties of the drug "Zedoary." *C. caulina* is common at Mahábaleshvar and on the higher Gháts elsewhere, and *C. amada* occurs in the Konkan and Gujarát. Turmeric is the rhizome of the cultivated *C. longa*. *Alpinia Allughas*, with fine rose-coloured flowers, grows in moist places in the South Konkan. *A. galangas* and *A. calcarata* occur in the same district. *A. nutans*, a native of China and the Indian Archipelago, is a common ornament of Bombay gardens. *Costus speciosus*, a member of a widely-spread tropical genus, is a very showy plant, with large pure white flowers; it abounds on the banks of the Konkan rivers. *Phrynium capitatum*, a small plant with pink flowers, grows in the Konkan jungles. Amongst the naturalised plants of the order we find three species of *Heliconia*, a tropical American genus. *Ravenala Madagascariensis*, the Water tree or Traveller's tree of Madagascar, is now pretty frequent in Bombay. It looks like a gigantic Plantain with its leaves arranged in the form of a fan; and it receives its common name from the circumstance that large quantities of water, derived either from rain, or from dew deposited on the surface of the leaf, are usually found stored at the lower part of the sheathing leaf stalk. *Amomum Zeylanicum* and *Kæmpferia rotunda*, from Ceylon and Southern India respectively, are both ornamental garden plants. *Elettaria Cardamomum*, the common Cardamom, is cultivated in Kánara. Several species of *Canna*, a large American genus, are now abundant in Western India, the commonest being *C. Indica*, *C. discolor*, and *C. lutea*. Of late years many species of the ornamental foliaged American genera *Calathea* and *Maranta* have been introduced. *M. arundinacea*, the West Indian Arrowroot, exists in a few gardens, and, judging from its luxuriant growth, is capable of being profitably cultivated in Bombay.

Orchideæ.—This large and very distinct natural order comprises upwards of 3,000 species, which may be arranged in two great divisions—*viz.*, *epiphytal* orchids which grow on other plants, and *terrestrial* orchids which derive their nutriment direct from the soil. The first division is confined to the moister parts of the tropics, and is specially abundant in South America, India, Burma, and the islands of the Eastern Archipelago. The terrestrial species occur chiefly in temperate regions, and also, but to a much less degree, in the tropics. Epiphytal species appear to favour a warm and, above all, a perennially moist climate, and for this reason they are far less abundant in Bombay, where the greater portion of the year is dry, than in other and more congenial parts of India. Hardly more than thirty epiphytal species are indigenous, inhabiting principally

the Ghát districts. Of terrestrial orchids there are nearly as many more, and these are distributed to the Konkan, the higher Gháts, and to parts of the Deccan. For this comparative paucity of species the immense number of individuals in a few cases may in some measure compensate. The plants of this order are chiefly prized for their beautiful and curious flowers, but of our indigenous species not more than four or five are worthy of cultivation. Compared in this respect, however, with the orchids of other parts of the world, the Asiatic members of the order decidedly bear off the palm. Amongst the species found in Western India two of *Oberonia* occur on Ghát trees. Of the large cosmopolitan tropical genus *Dendrobium* we have five or six representatives, none of which are noted for any special floral beauty: they are common on trees all along the Gháts. *Cirrhopetalum fimbriatum*, an elegant plant with red and cream-coloured flowers, occurs on the Southern Gháts. *Eria braccata* is a delicate little orchid common on the trees near Mahábaleshvar. Two other species occur in the South Konkan. One species each of *Microstylis*, *Pholidota*, *Cottonia*, *Micropera*, and *Sarcanthus* are found on the Southern Gháts. *Saccolabium Blumei*, a most beautiful plant, is very abundant on the mango trees in Sálsette, as are also *S. papillosum*, with insignificant greenish flowers, and *S. rubrum*, with rose-coloured flowers. The latter grows, too, on the "mhowa" trees in Khándesh and Gujarát. Two or three other members of this genus are found along the Southern Gháts. Two species of the terrestrial genus *Geodorum* occur in the South Konkan. Of *Eulophia*, another terrestrial genus, we have four or five representatives. *E. pratensis* is common in the Deccan, and the others are Konkan plants. *Aërides* includes more than one handsome species. *A. crispum* abounds on trees and rocks at Mahábaleshvar, its large purple and rose-coloured flowers making it a conspicuous object during the hot season. *A. Lindleyanum* and *A. maculosum*, less handsome species, are common in Sálsette. *A. Wightianum*, with yellow flowers, is found in the South Konkan. A very large orchid, *Cymbidium aloefolium* is common on Konkan trees. One species of *Luisia* occurs in the South Konkan. *Pogonia*, *Spiranthes*, *Cheirostylis*, and *Monochilus*, all terrestrial genera, are each represented by a single species, found on the Gháts to the south. *Spiranthes Australis*, our indigenous plant, has a very wide range, extending over part of Europe, and through Asia to Australia and New Zealand. Other members of this genus are American. Of the large cosmopolitan terrestrial genus *Habenaria* we have seventeen or eighteen indigenous species. These are distributed chiefly to the Konkan and Gháts, with a few also to the Deccan. All have white or yellowish-green flowers, which in some cases are delicately fragrant. *H. rariflora* is exceedingly common at Mahábaleshvar, flowering in the hot season. The principal species, however, is *H. Susannæ*, the giant Orchis; this grows on the bleakest parts of the higher Gháts opposite Bombay, and occasionally on some of the South Konkan hills. It has a stem about four feet in height, and bears large white flowers. It is also a native of China and the Archipelago. Two species of *Peristylis*, the last indigenous genus on our list, occur in the South Konkan and a third in the Deccan. But few introduced plants of this order are to be seen in Bombay. *Vanilla aromatica*, a Mexican plant, appears to thrive fairly so far as stem and leaves are concerned, but not so well as in a moister climate. It has not yet fruited here. *Phalænopsis grandiflora*, a native of Java, is a splendid species, and flowers freely in Bombay. *Phajus Blumei*, another handsome orchid from the same island, is occasionally seen in gardens.

Burmanniaceæ and Taccaceæ are two small orders each represented in the Bombay flora by a single species. *Burmannia triflora*, belonging to a cosmopolitan genus, is a small herbaceous plant with purple flowers, found

sparingly in the Konkan. *Tacca pinnatifida*, a stemless plant with green flowers and a large tuberous root, is common in the same district. It has a wide range over the Archipelago, Australia, and the islands of Polynesia. The root contains much starch, which is occasionally eaten.

Amaryllideæ.—This important order is distributed principally to warm dry countries. It is represented in the flora of Western India by twelve or fourteen species belonging to three genera. Three species of *Curculigo*, a small but widely spread tropical genus, are little plants with yellow flowers and grass-like leaves, occurring along the higher Gháts. They are very common at Mahábaleshvar at the beginning of the rains. Of the cosomopolitan genus *Crinum*, *C. Asiaticum* is our commonest species. It is a large bulbous, very poisonous plant, with white flowers, and abounds near the Konkan rivers and the coast: it extends to Australia and the Archipelago, and in Bombay is often planted in gardens. A very similar plant, *C. Roxburghii*, occurs on the banks of the Deccan rivers. *C. augustum*, with fragrant rose-coloured flowers, is found in the same localities. *C. brachyneme*, a handsome species, also with fragrant flowers, grows on the higher Gháts. *Pancratium parvum*, a beautiful lily-like plant with showy white flowers, abounds on the Ghát and Konkan hills. Of the important American genus *Agave* of this order, *A. cantala* and *A. Americana* have become naturalised in Western India. The former occurs abundantly in parts of the Konkan and Deccan and on the eastern slopes of the Gháts. Both yield valuable fibre. A third species, with stiff thorny leaves, quite a formidable plant, is used about Poona for fencing purposes. *Fourcroya gigantea*, another American species, with its enormous sword-shaped leaves and tall flower stem, is a conspicuous plant in Bombay gardens. *Zephyranthes rosea* and *Amaryllis equestris*, West Indian flowering plants, are very common here

Dioscorideæ are twining herbs with large tuberous roots which contain abundance of starch. Six or seven species of *Dioscorea* are plentiful in the Konkan and Ghát jungles and the other forest districts of the Presidency. *D. pentaphylla* has fragrant flowers which are eaten as a vegetable. The root of *D. oppositifolia* is also eaten. The genus is dispersed throughout most tropical countries. Yams are the roots of *D. sativa*, *D. globosa*, and *D. aculeata*, all of which are much cultivated in Bombay. The first is indigenous and abounds in the Konkan. It spreads through the Indian Archipelago to Australia.

Liliaceæ.—This large order, like the *Amaryllideæ*, is distributed chiefly to dry and warm countries, and is most abundant in the south of Europe and at the Cape. In Western India it is very sparingly represented, not more than twenty species, at the outside, being indigenous. Of the large cosmopolitan genus *Smilax*, *S. ovalifolia* is our sole indigenous representative. It is a common climbing plant of the Ghát jungles and of some of the other forest districts. The Sarsaparilla of the Pharmacopœia, *S. officinalis*, a native of Central America, was introduced into Bombay a few years since: it promises to succeed well in this climate. *Flagellaria Indica* is a tall climber, with white flowers and red berries, found along the coast. It extends to Australia and Africa. *Asparagus sarmentosus* is another climber, abundant on the higher Gháts and in the Deccan and Gujarát. Being a rather ornamental plant, with graceful feathery foliage and fragrant white flowers, it is a frequent inhabitant of gardens. *A. officinalis*, the well-known vegetable, a European and British species, is occasionally cultivated in gardens in the northern parts of the Presidency. Six or seven species of *Chlorophyton*, a genus extending to Africa and Australia, occur on the Gháts and in the Konkan. *C. tuberosum* is very

common. Of the Indian genus *Ledebouria*, two indigenous representatives have been described. *L. maculata*, with spotted leaves and blue flowers, grows in the Konkan and the Deccan, and *L. hyacinthina*, also with blue flowers, in the South Konkan. The African genus *Uropetalum* gives us at least two small species, the one found in the Deccan and the other in the Konkan. *Urginea Indica*, a member of a south European and Mediterranean genus, is very abundant along the coast, particularly to the north of Bombay. Its dried bulbs are now substituted at the Medical Stores for the Squills of the Pharmacopœia, which are yielded by *U. maritima*, a native of South Europe and Malta. *Methonica superba* is a common and well-known climbing plant of the Konkan jungles. Its gorgeous red and orange flowers render it a conspicuous object during the rainy season: the tuberous root is a most virulent poison. In Bombay we find several naturalised species belonging to this order. Amongst them are numerous representatives of the large genus *Dracæna*, natives chiefly of the Archipelago and Polynesia. They are all well-known ornamental shrubs. *Yucca gloriosa* or "Adam's needle," a Mexican species; *Polianthes tuberosa*, the Tuberose, indigenous to India; and *Sansviera Zeylanica*, from Malabár and Ceylon, are all common in gardens. A second member of the latter genus from Singapore was introduced a few years ago and has now become thoroughly established. Both plants yield a strong and valuable fibre. The yellow-flowered *Aloe striatula*, from which the excellent variety of medicinal Aloes, called Jafarabad Aloes, is obtained, is common in Bombay and its neighbourhood. It is cultivated in Káthiáwár, where the drug is prepared, and although noted here amongst the naturalised plants of the order, there is good reason for believing it to be truly indigenous to Western India. *A. Socotrina*, which yields the famed Socotrine Aloes, and is a native of Socotra and the adjoining mainland, is frequently seen about Poona. Except, however, in its having red flowers, it does not appear to differ materially from the first-named plant. They are possibly varieties of one species. *Allium sativum*, the Garlic, and *A. cepa*, the Onion, both belonging to this order, are much cultivated in Western India.

Pontederaceæ is a small but widely diffused aquatic order, nearly allied to the preceding. Two species, *Monochoria vaginalis* and *Pontederia hastata*, inhabit tanks in most parts of the Presidency. The first spreads to China and the Archipelago. Both are handsome plants with showy blue flowers.

Of the small cosmopolitan tropical family, Xyrideæ, we have one indigenous representative—*Xyris Indica*—a little plant with yellow flowers, found in salt marshes along the coast. The genus is as widely distributed as the order.

Commelynaceæ.—The members of this order are chiefly natives of India, Africa, and Australia. Between twenty and twenty-five species are found here, springing up everywhere during the rainy season. They often resemble in appearance a broad-leaved grass, for which they might easily be mistaken by a careless observer. Most of the Bombay plants of this family are distinguished by their delicate blue flowers, which are not unlike those of the British Forget-me-not. *Commelyna Bengalensis* and *C. communis* are common everywhere; the first occurs also in Africa and the latter in Australia. Ten or twelve species of the widely diffused genus *Aneilema* are found in the Konkan. *A. ochraceum* and *A. versicolor* differ from the others in having yellow instead of blue flowers. *A. giganteum* spreads to Australia. Seven or eight indigenous species of the Asiatic and African genus *Cyanotis* are described. *C. vivipara* grows on the

trees of the Southern Gháts. *C. fasciculata*, which abounds in rocky places in the Deccan, has rose-coloured flowers. It is also an African species. *C. tuberosa* is abundant, too, in parts of the Deccan. *C. cristata* is the commonest species in the vicinity of Bombay. *C. axillaris*, which extends to Australia, is most plentiful in cultivated land throughout the Deccan. During the late season of scarcity its seeds were largely used as food by the poorer classes. *Floscopa paniculata*, which is exceedingly like a grass in appearance, grows on the Gháts. It is a cosmopolitan tropical plant. Our only foreign species of this order are the American *Tradescantia discolor* and *T. zebrina*. They have green and purple leaves and white flowers, and are both very common in gardens.

PALMÆ.—This great and splendid tropical family is second to none in its importance to man. They have been often said to rank next in utility to *Gramineæ*. The number of our indigenous Palms will appear very small indeed when the frequency of the order in other parts of India is remembered. This paucity of *Palmæ* is a noticeable feature in the Botany of the Bombay Presidency, and what renders the fact more remarkable is, that when the southern limits of the Presidency are passed, the number of species appears suddenly to increase. They are far more abundant in Ceylon and in the South and East of India than they are here. Not more than five species can be considered indigenous. The first of these is *Calamus Rotang*, the Cane or Rattan, a climbing palm with thorny stem and leaves; it is common in the dense junges of the Southern Gháts and Kánara. *C. tenuis*, a Ceylon and Assam cane, occurs in a few of our gardens. This genus is abundant in tropical Asia, extending also into Africa, the Archipelago, and Australia. *Caryota urens*, the "Mhád" Palm, a member of a small Asiatic and Australian genus, abounds in the Goa and Kánara jungles, but occurs somewhat less frequently in other parts of the Ghát and Konkan valleys. North of Bombay it does not seem to exist in the wild state. *C. sobolifera*, from the Indian Archipelago, was introduced a few years ago and is now pretty frequent in Bombay gardens. *Borassus flabelliformis*, the well-known Palmyra, is chiefly abundant in the Konkan between Bombay and Bulsár. It also occurs in the forest districts east of Baroda, and in other parts of Gujarát, and occasionally in the Deccan. *Phœnix sylvestris*, the familiar wild Date or Toddy Palm, grows in all parts of the Presidency, generally planted however. It is very common in moist ground and near river banks in the Deccan; and in the Konkan it is extensively cultivated for toddy. *P. acaulis*, which is not unlike a stemless or stunted variety of the preceding, is common on the Gháts. A few specimens of *P. dactylifera*, the Date Palm, exist in Bombay. The climate here is too moist, however, to permit of the tree being successfully cultivated. Amongst our non-indigenous species the chief are *Areca catechu*, the Betel or "Supári" Palm, and *Cocos nucifera*, the Cocoa-nut. Both these are largely cultivated throughout the tropics, especially near the sea. In Western India immense mixed plantations are to be seen in sandy soil all along the coast, from Sálsette to Kánara. Inland, too, they are often found planted near tanks and temples. The original home of these Palms has never yet been satisfactorily determined. Several other exotic Palms, some of them of long standing in Bombay, may be mentioned. *Kentia Wendlandiana* and *Ptychosperma elegans* are two beautiful Australian Palms, lately introduced. *Oreodoxa regia*, from Brazil, is a noble Palm, of which a few well-grown specimens may be seen in the Victoria Gardens. *Pinanga Kuhlii* and *Dæmonorops palembanicus* from the Indian Archipelago, are also recent acquisitions. *Hyphæne Thebaica*, the curious branching Doum Palm of Egypt, grows in the old Siwri gardens and on Malabár Hill. The soft inner coating of the fruit tastes exactly like gingerbread: hence the English name of the

tree, Gingerbread Palm. Of *Corypha umbraculifera*, the celebrated Talipot, a native of Ceylon and Southern India, two fine specimens stand in the compound of Grant College. *Rhapis flabelliformis* is a small Chinese Palm which has long been an inhabitant of Bombay gardens. Four species of *Livistona*, three of them from the Archipelago, and one, *L. Australis*, from Queensland, were introduced a few years ago and, so far, have grown luxuriantly. The most valuable, however, of all our recent introductions is *Elæis Guineensis*, the Palm-oil tree of Western Africa. To judge from its manner of growth, it will evidently succeed well in this climate.

PANDANEÆ.—Only two species of this, the Screw-Pine order, are indigenous to Western India. *Pandanus odoratissimus*, a native also of Australia and the Archipelago, is a very common bush throughout the Konkan, particularly near the sea. Its long prickly leaves and straight roots springing from the stem and branches, render it a curious and interesting natural object. The male flowers are highly fragrant and may be smelt from a distance of several yards. *P. furcatus* is much like the preceding, except that its leaves are somewhat broader and of a brighter green. It is found in great abundance in wet ground in Sávantvádi and Kánara, where it appears to replace the first almost completely. *P. Javanicus* and *P. labyrinthicus*, natives of the Archipelago, are now pretty common in Bombay gardens. A very considerable proportion of this genus is indigenous to Mauritius. *Carludovica palmata*, a tropical American species of the order, and an extremely handsome palm-like plant, has been lately introduced and is rapidly multiplying. The celebrated and costly Panama hats are made from its leaves.

AROIDEÆ.—This family abounds in the moister parts of the tropics, especially of South America, and a few species occur in temperate regions. In Western India we have from sixteen to twenty indigenous representatives, some of which are, however, but imperfectly known. With one or two exceptions all are confined to the Konkan and Gháts and to Kánara. Of the widely dispersed genus *Arisæma* we possess at least three species. *A. Murrayii* is the well-known Snake-lily, so abundant at Mahábaleshvar. *Amorphophallus campanulatus*, a plant with an immense tuberous root, which is eaten, and a great spreading branched leaf, is largely cultivated in Western India. It occurs wild in parts of the Konkan. *A. sylvaticus*, a much smaller plant, is exceedingly abundant in the Konkan and on the Gháts during the rains. *Typhonium bulbiferum* occurs in the South Konkan, and *T. divaricatum*, which has a deep crimson spathe, is common near Bombay. The genus is widely spread through the Old World tropics. In the rainy season *Tapinocarpus Indicus* and *Ariopsis peltata* are frequent in the Konkan. *Remusatia vivipara* grows in holes in the trunks of trees and rocks along the higher Gháts. *Cryptocoryne Roxburghii*, a pretty common species, and *Lagenandra toxicaria*, are found in marshy places. The latter occurs in the South Konkan and in parts of the Deccan, and is said to be a highly poisonous plant. *Colocasia antiquorum*, commonly cultivated in Bombay as a vegetable, is a doubtful native. It is indigenous on the other side of India and is often seen here, apparently wild, in marshy ground. It may, however, have escaped from cultivation. *Pothos scandens* and *Scindapsus pertusis*, curious plants, climbing and rooting on trees, are common in the Ghát and Konkan jungles. The first-mentioned genus spreads to Africa and Australia. The latter plant has a thick fleshy stem, and broad leaves pierced with large holes. *Pistia stratiotes* is an odd little floating aquatic plant of this order, plentiful in tanks everywhere. It may be easily recognised by its stiff fan-like leaves. The species is very widely spread through the tropics.

Amongst the introduced representatives of *Aroideæ*, the following are found in Bombay :—*Caladium*, of which so many varieties are cultivated in our gardens as ornamental plants, is a South American genus. A few species, however, occur in other parts of the tropics. At least one hundred varieties are known here. Several exotic species of *Alocasia* also have of late years become very common and are highly ornamental plants. *Acorus calamus*, the Sweet Flag, a native of Great Britain, may be occasionally seen. *Dieffenbachia Seguine*, the Dumb-cane of the West Indies, and one of the most poisonous of plants, has long been an inhabitant of Bombay and Poona gardens. Several other members of the same genus, together with species of *Philodendron* and *anthurium*, all South American plants, have been recently introduced.

Of the very small but cosmopolitan aquatic order TYPHACEÆ, we possess one indigenous representative. *Typha elephantina* is a tall Bulrush which is abundant in tanks and streams in most parts of the Presidency. *T. angustifolia*, the lesser Bulrush of Great Britain, a most widely diffused species, has not yet been detected in Western India, but as it is indigenous in many other parts of the country, it is highly probable it exists here also.

LEMNACEÆ, another small aquatic order, gives us two species. *Lemna trisulca*, the Duckweed, a minute floating plant, is as common in stagnant water here as it is in Europe. It occurs in nearly every climate. *L. globosa*, a still smaller plant, often forms a considerable part of the green scum on the surface of tanks. Other species of the genus are as widely dispersed.

NAIADEÆ, also an aquatic family, is chiefly interesting on account of the very extensive distribution of some of its species. Four or five members of the cosmopolitan genus *Potamogeton* are found in tanks and streams in all parts of the Presidency. Of these, *P. natans*, the Pondweed, *P. perfoliatus*, *P. crispus*, and *P. pectinatus* are indigenous also to Great Britain ; the first and two last to America, and all to Australia. The common Grasswrack, *Zostera marina*, occurs in salt marshes along the coast, and is found in similar situations and in tidal estuaries in most parts of the world. *Naias Indica*, belonging to another ubiquitous genus, is common in tanks.

ALISMACEÆ resembles the three preceding orders in being aquatic and in the extensive distribution of some of its species. Four or five are found in Western India. Two at least of *Sagittaria*, a genus spread throughout the northern hemisphere, are pretty common in the Konkan and Gujarát tanks. *Butomopsis lanceolata*, the single species to which the genus is limited, occurs also in Gujarát. It extends over tropical Asia, Africa, and Australia. *Aponogeton monostachyus*, which is quite as widely dispersed as the last, is found in standing waters in the Deccan.

ERIOCAULONEÆ consists of the single genus *Eriocaulon*, nearly all the species of which are aquatic and are distributed to the tropics of the Old World and Australia. They are generally grass-like plants. Ten or twelve species are indigenous to Western India and are most commonly found in marshes, tanks, and rivers in the Konkan. *E. sexangulare* extends to Africa and *E. quinquangulare* to Australia.

CYPERACEÆ.—This, the Sedge order, contains upwards of two thousand species, diffused over the whole world, especially in the colder regions of the northern hemisphere. In marshy plains, on the banks of rivers and lakes, and on the slopes of high mountains they often take the place of grasses, covering a large extent of surface. In this Presidency, although there are comparatively but few species, yet individuals abound, not only in wet localities everywhere but in the drier Deccan pastures and along the summits of the higher Gháts. Between forty and fifty species of

the order occur in Western India, nearly one-half of which belong to the great tropical and sub-tropical genus *Cyperus*. These latter are very common in almost every part of the Presidency. *C. polystachyus*, *C. squarrosus*, *C. difformis*, *C. Haspan*, *C. distans*, *C. compressus* and *C. rotundus* are cosmopolitan, being found not only here and in other parts of India and Asia, but in Australia, Africa, and America. The bulbous roots of the last are bitter and aromatic, and are used as medicine and as a perfume. Amongst our other indigenous representatives of the genus, *C. pumilus*, *C. globosus*, *C. alopecuroides*, *C. tuberosus*, *C. iria* and *C. umbellatus* are widely spread through the intertropical countries of the Old World. *Kyllinga monocephala* and *Heleocharis capitata* are also cosmopolitan in the tropics. *Fimbristylis*, another genus of warm climates, gives us five or six indigenous species, and of these *F. monostachya*, *F. ferruginea*, and *F. quinquangularis* are found throughout the tropics of both Old and New Worlds and in Australia. The last is our commonest species. *F. miliacea* has nearly as wide a range. Seven or eight species of *Scirpus* are indigenous to Western India, occurring chiefly in and about tanks. *S. squarrosus* and *S. articulatus* are also Australian and African plants, but *S. maritimus* spreads over most parts of the world, including Great Britain. Few genera have so extensive a range as this, its members being found not only in every tropical and temperate country, but also in the Arctic and Antarctic regions. Of the cosmopolitan genera *Lipocarpha*, *Fuirena*, *Rhynchospora* and *Scleria* we possess one species each. *Carex Indica*, the solitary representative in the Bombay flora of a genus numbering upwards of one thousand species, grows at Mahábaleshvar. This great genus is distributed to cold and temperate regions and to mountainous districts within the tropics.

GRAMINEÆ.—The Grass order comprises nearly 4,500 species, abundantly diffused over all parts of the globe, in every variety of station, and ranging in size from small herbaceous plants a few inches in height to tall Bamboos, which in some cases attain a growth of nearly one hundred feet. The important nutritious principles contained in the stems and leaves, and more especially in the seeds of this immense family, entitle it, in an economic and political point of view, to take by far the highest rank amongst the various classes of plants useful to man. This conclusion will appear sufficiently obvious when it is remembered that three great staples of life—wheat, rice, and sugar—are among its products; to say nothing of the countless myriads of lower animals to which this order affords the means of existence, and through these again to mankind.

The major portion of *Gramineæ* inhabit the temperate zone, but the tribes, or divisions, *Paniceæ*, *Andropogoneæ*, *Chlorideæ*, and *Bambusaceæ* are especially tropical, and to these fully seventy-five per cent. of our known indigenous species belong. As far as the flora of Western India is concerned, this natural order has never yet been completely investigated: up to the present hardly more than ninety species have been enumerated, and judging from the fact that several additions to the catalogue have recently been obtained in the vicinity of Bombay itself, it is scarcely too much to assume that careful research in the less explored districts of this Presidency will yield many more. As regards number of species, *Gramineæ* stand second on our list of indigenous orders of flowering plants. *Leguminosæ* being the first, but with respect to individuals the grasses are probably more numerous than all these other orders put together. As with *Cyperaceæ* a great many tropical grasses are cosmopolitan in their distribution: some of the commonest Bombay species range round the world. A few of our grasses are, in Western India, confined to the higher Gháts, others to the Deccan and Gujarát, but the majority are diffused over the whole Presidency. It will of course be understood that the greater number make their appearance during the rainy season only.

The first species to be mentioned is the well-known and widely spread *Coix lachryma*, the large hard stony fruits of which are called "Job's Tears." It is a tall coarse grass very abundant in marshy ground in the Konkan. *Paspalum scrobiculatum*, also an African and Australian species, is the cultivated "Kudru," a grain often used by the poorest classes of the Konkan. Under certain circumstances, not yet fully understood, this grain produces symptoms of narcotic poisoning in persons who eat it, such a result being not improbably due to the development of a fungus. *Eriochloa punctata*, belonging to a small but widely diffused tropical genus, occurs about Bombay. Of the immense genus, *Panicum*, fifteen or sixteen species are described as indigenous to this part of India, while others are cultivated. Amongst the former *P. stagninum*, *P. cimicinum*, *P. flavidum*, *P. helopus*, *P. colonum*, *P. Burmanni*, *P. crus-galli*, and *P. myurus* are the commonest. The four last, together with *P. prostratum* and *P. sanguinale* are also found in Australia and tropical Africa, and at least four of those enumerated occur in America. *P. Nepalense* is a Ghát grass. The principal cereals of this genus which are cultivated in Western India are *P. frumentaceum*, *P. miliaceum*, *P. Italicum* and *P. pilosum*. The celebrated Guinea-grass is *P. maximum*, a native of Western Africa. It is now largely grown, for Commissariat use, in the northern parts of the Presidency. *Setaria glauca* and *S. verticillata*, both cosmopolitan plants, are pretty common. *Pennisetum aureum* is frequent in the Deccan and two species of *Cenchrus* in Gujarát. Of *Lappago*, *Perotis*, *Manisurus*, *Ophiurus*, *Oropetium*, *Rottbœllia*, and *Chionachne* we possess one representative each. *Manisurus granularis*, which is plentiful everywhere, and *Ophiurus corymbosus*, a tall coarse Deccan and Gujarát species, range round the world in the tropics. *Chionachne barbata* extends to Australia. *Ischæmum*, which is chiefly an Asiatic genus, furnishes at least four indigenous species; all of these are abundant in the Konkan, and a considerable proportion of the green monsoon fodder used in Bombay consists of *I. conjugatum*. *I. pilosum* abounds all over the Presidency. *Saccharum spontaneum*, usually a gigantic grass, but variable in size, grows in many parts of Western India. In the Dáng, Khándesh, and Gujarát forests, where it forms the principal mass of undergrowth, it often attains a height of seven or eight feet; on the banks of the Deccan rivers it reaches six feet, but in other situations, in dry or poor soil, it is scarcely more than two feet in height. The huts of the wandering Brinjáris are formed of the stems of this grass. *S. officinale*, the Sugarcane, is much cultivated in Gujarát, Khándesh, and the Deccan. The great tropical genus *Andropogon* is represented in the Bombay flora by fifteen or sixteen species. *A. iwarancusa*, *A. muricatus*, and *A. Schœnanthus* are aromatic. The first is probably the source of one kind of False Spikenard; the fragrant roots of the second are the familiar "Khuskhus;" and from the third, which is a widely-spread plant of the Old World tropics and Australia, and which abounds in Eastern Gujarát, the well-known "Rusa" oil is distilled. *A. contortus*, a very common grass here, is found in all parts of the tropics. *A. aristatus*, *A. acicularis*, and *A. verticillatus* extend to Mauritius, and the second also to Australia. *A. scandens* and *A. glaber* are common Deccan fodder grasses. *A. citratus*, a garden species in Bombay and probably a native of Ceylon, is the sweet-smelling Lemon-grass. Another highly aromatic member of this genus, and whose specific name is as yet undetermined, grows on the walls of tanks and wells in the neighbourhood of Bombay, and is reported to be cultivated in Khándesh along with the "Rusa." *Anthisteria cymbaria* is a large coarse plant, abundant everywhere. *A. ciliata*, smaller and still more abundant, is one of our best fodder grasses: the greater part of the hay used here is composed of it. The latter species is indigenous also to tropical Africa and America, and is the celebrated Kangaroo grass of

Australia. *Psilostachys filiformis* is a small plant of the higher Ghâts. *Apluda aristata* is plentiful everywhere in hedges and under trees; it has frequently a length of seven or eight feet. Four species of *Arundinella*, a widely diffused tropical genus, are common on the Ghâts. *Aristida setacea*, *A. hystrix*, and *A. depressa* are the well-known and troublesome spear-grasses, so common in the Deccan. The last mentioned extends to Australia and Africa. The most abundant grass in the Presidency is probably *Cynodon dactylon*, the "Hariala." It is found in nearly all hot, and in some temperate, countries, and in the south of England it appears also to have established itself. In stony ground and on roadsides in the Deccan *Melanocenchrus Rothiana* abounds. The cosmopolitan *Chloris barbata* is plentiful everywhere, and a second indigenous species is said by Dalzell to be found only on the old city walls at Surat. *Eleusine Ægyptiaca*, a small stiff creeping grass, is common about roadsides and on dry banks and rubbish heaps. Like so many others, it is diffused through all parts of the tropics. A second species, which is probably *E. Indica*, occurs in similar localities and has an equally extensive distribution. *E. coracana* is the cultivated "Nágli." *Leptochloa calycina* is an elegant grass frequent in the Konkan, and *L. Chinensis* is also occasionally seen. Of the widely diffused tropical genus *Sporobolus* we have three indigenous species, and of *Isachne*, *Uniola*, *Phragmites*, *Elytrophorus*, and *Kœleria* one each. *Sporobolus diander* and *Elytrophorus articulatus* spread to Australia. *Phragmites Roxburghii* is a great reed often growing, in favourable situations, to a height of fifteen or sixteen feet. There seems to be some doubt, however, whether it is truly indigenous on this side of India. *Kœleria lagopodioides* is a small grass common in salt or sandy soil. The local flora contains eight or ten species of the large tropical genus *Eragrostis*. The most abundant of these are *E. nutans*, *E. tenella*, and *E. viscosa*. The second, with *E. pilosa*, extends to Australia. The flowers of the last are covered with a disagreeably smelling viscid substance. *Poa flexuosa* is, so far, our only known representative of a large genus—one of the most widely distributed of the order. Of Bamboos we have at least five or six indigenous kinds, one or two of which do not as yet appear to have been fully described. *Bambusa arundinacea* is the commonest species in Western India and grows in all the moist forest districts from Káthiáwár and the Sátpudás to Kánara. In the latter province and in Goa and the southern parts of Dhárwár it is exceedingly abundant, forming impenetrable jungles. When well grown and standing apart there is no more graceful plant in the whole vegetable kingdom. *B. vulgaris* has a yellow stem and denser foliage than the first. It is cultivated in some parts of the Deccan, but would seem to exist wild only towards the extreme south. *B. arundo* is a Ghát species and is frequent at Mahábaleshwar. *Dedrocalamus strictus*, our only indigenons species, is the variety of Bamboo from which the handles of boar-spears are made. The numberless important uses to which Bamboos of all kinds are put in this country, are too well known to need further mention here.

Besides the cultivated species of the order which have been already noted, there are several others largely grown in Western India, and so familiar to every one as to require only to be enumerated. Amongst these are *Sorghum vulgare* and its varieties, Jowári, and "Imphee" or Chinese Sugarcane; *Oryza sativa*, the Rice; *Zea Mays*, the Indian Corn, a native of America; *Penicillaria spicata*, the Bájri; *Triticum æstivum*, Wheat; and *Hordeum hexastichon*, the six-rowed Barley. Attempts are often made to grow English fodder grasses in this part of India, but, as might naturally be expected, such grasses are quickly supplanted and killed by the indigenous species.

The description of the flowering plants of Western India terminating with this order, I shall next proceed to give a brief account

of our indigenous CRYPTOGAMIA, or flowerless plants. It may be mentioned, however, that the species belonging to this class which are included in the Bombay flora have never as yet been fully described or investigated, and there are doubtless multitudes of new species still to be discovered. Under such circumstances, therefore, the account which I shall offer here of the Bombay CRYPTOGAMIA will of necessity be exceedingly imperfect.

FILICES, or Ferns, are, in Western India, almost entirely confined to the moister Ghát districts, and the greater the elevation the more abundant do both species and individuals become. About fifty species are at present known to occur within the limits of this Presidency. None of them would appear to be peculiarly restricted in their distribution; they are all more or less dispersed over various parts of India, and in some few instances are widely diffused throughout the Old World. Along the banks of rivers and in marshy places near the coast towards the south, *Acrostichum aureum* exists in great quantities. *Stenochlœna scandens* is a fern which climbs to the tops of the highest trees in Kánara. *Pœcilopteris terminans* grows in the jungles along the lower part of the Gháts. *Blechnum orientale*, a large and handsome fern, is found in the South Konkan and in Kánara. *Gymnopteris Feei* is common on trees at Mahábaleshvar. *Adiantum lunulatum*, a small slender fern, of most elegant appearance, abounds throughout the Konkan and on the Gháts. *A. caudatum*, much less common, occurs on the higher Gháts. *A. Capillus-veneris*, the well-known Maiden-Hair, grows under sheltered banks, near water-courses, in the Deccan, Khándesh, and Gujarát. *Cheilanthes farinosa*, known here as the Silver Fern, abounds everywhere along the Gháts. It is widely distributed through the tropics. *C. tenuifolia* occurs in dry localities in the Deccan. *Pteris aquilina*, the Braken, a familiar British fern, is very abundant at Mahábaleshvar. *P. longifolia* and *P. pellucida* are also found there. *P. quadriaurita* is very common in most of the shady Ghát jungles, and a beautiful green and white variety may be seen in Bombay gardens. *Actiniopteris radiata*, in appearance like a miniature palm, grows on rocks and old walls in the Deccan. *Asplenium planicaule* and *A. trapeziforme* occur at Mahábaleshvar. *Athyrium falcatum* and *A. filix-fœmina* are found in the same locality. The latter is better known as the Lady fern. *Allantodea Brunoneana* grows in moist places along the Gháts and in Kánara. *Callipteris esculenta* is one of the commonest large ferns of the higher Gháts, and also of Bombay gardens. *Hemionitis cordata*, a delicate little species, occurs on the Southern Gháts and in Kánara. *Gymnogramma leptophylla*, another small and delicate fern, is found at Mahábaleshvar and in parts of the Deccan. *Goniopteris prolifera* is a climbing fern of the Konkan. *Niphobolus adnascens*, *Pleopeltis Wightiana*, and *P. membranacea* abound on the trees of the Ghát and Konkan jungles. *P. phymatodes* occurs more to the south. *Drynaria quercifolia*, the Oak fern, grows on trees in most parts of the Konkan. *Aspidium polymorphum* is found at Mahábaleshvar and along the higher Gháts. *Sagenia coadunata*, known also as the Oak fern, abounds in all the shady Ghát jungles *Nephrodium molle* is plentiful at Mahábaleshvar and on the eastern slopes of the Gháts. Three species of *Lastrœa*—*L. cochleata*, *L. eriocarpa*, and *L. sparsa*—occur in the same situations. *Nephrolepis tuberosa* is found in Kánara, and this species, together with *N. exaltata*, from Southern India, and *N. Davallioides*, a native of Malacca and Singapore, are common garden ferns of Bombay. *Acrophorus pulchra* and *A. immersus*, both small, delicate, and rather rare ferns, grow in the shadiest Ghát jungles, as does also *Davallia tenuifolia*, which much resembles them. *Peranema cyatheoides* is a beautiful but somewhat scarce Mahábaleshvar fern, found in moist shady locali-

ties. *Gleichenia dichotoma*, cosmopolitan in the tropics, is a creeping fern occurring in the Konkan and on the Gháts towards the south, also in Kánara. *Lygodium scandens* and *L. flexuosum* are elegant climbing ferns of the South Konkan and Ghát jungles. *Osmunda regalis*, the Royal Fern, also a British species, grows in the water-courses at Mahábaleshvar. It is cosmopolitan in temperate regions. *Angiopteris evecta*, another widely diffused species, is a large and handsome fern with a stem from three to four feet in height, and broad spreading fronds from twelve to fifteen feet in length; it occurs in the jungles of the Southern Konkan and Kánara. *Botrychium virginicum*, a kind of Moonwort, together with *Ophioglossum reticulatum* and *O. pendulum*, Adders-tongue ferns, are found sparingly in grassy places on the Gháts. *Helminthostachys Zeylanica*, a curious looking species, grows in the South Konkan. Besides the indigenous ferns mentioned above, numerous exotic species of this order have of late years been introduced into Bombay, where they may frequently be seen in gardens.

Of MARSILEACEÆ, an aquatic cryptogamous order, a few species are found in the Konkan. *Marsilea quadrifolia* is very common on the margins of tanks in the neighbourhood of Bombay and in Gujarát. It is also indigenous to Europe, as well as to Australia and other parts of the world. SALVINIEÆ is another small aquatic family, of which we possess one species, the widely spread *Salvinia natans*, a minute floating plant of tanks and marshy places. LYCOPODIACEÆ, the Club Moss order, has at least seven or eight representatives in this part of the world. They grow chiefly in the moist shady jungles of the Gháts and Konkan. *Lycopodium Phlegmaria*, a widely diffused species, is parasitic on Ghát trees. *L. cernuum*, *L. circinale*, and *L. volubile*, with some two or three other undetermined members of the order, occur in the Konkan. A few exotic species of *Lycopodium* and *Selaginella* are ornamental plants of Bombay gardens. *Isoetes Coromandelina*, belonging to the little order ISOETEÆ, is a grass-like plant occurring in tanks and marshes. Our indigenous species of the cryptogamic orders CHARACEÆ, MUSCI, LICHENES, FUNGI, and ALGÆ are so very imperfectly known, that it is impossible, and indeed unnecessary here to do more than mention a few of the commonest. When the abundance in temperate or cold climates of the last four orders is borne in mind, the comparatively scanty members by which such large families are represented in Western India can hardly fail to strike an observer. This is true as regards species of any size, but the microscopic species of some of these orders are probably abundant enough. A species of *Nitella*, belonging to the first mentioned order, grows in green hair-like masses in ditches during the monsoon. A few of the MUSCI, or Mosses, are found on old walls about Bombay, and in other parts of the Konkan, in the rainy season; their numbers are, however, increased by the greater elevation and diminished temperature of the higher Gháts. At Mahábaleshvar, for instance, although there are still but few species to be noticed, yet for this the abundance of individuals, which clothe every tree and rock, will serve to compensate. The commonest *Lichens* on the higher Gháts are the cosmopolitan *Usnea barbata* and its variety *U. florida*. These are well known to Europeans as the White Tree-moss. A few other species of the order occur on the trunks of trees and on rocks in various parts of the Presidency, notably on the Palmyra palm. In large FUNGI the Bombay flora would appear to be very deficient. Two or three species of *Agaricus* are common on rubbish heaps during the rains. One of these closely resembles the Mushroom in many respects, and, like it, is edible. Several kinds of *Polyporus* grow on decayed trees and damp wood work; while a species of *Thelephora*, which is very similar to, if not identical with, the British *T. anthocephala*, is common on rotten stumps. A kind of *Phallus*, more delicate in appearance but still closely resembling the British species *P.*

impudicus, and possessing quite as fœtid an odour, is sometimes seen about Bombay in the rainy season. One of the Puff-balls—*Lycoperdon*—is pretty common at the same time of year. A species of *Reticularia*, a soft gelatinous fungus, occurs on the bottoms of flower tubs and on decayed and damp timber. On dead branches of trees one of the cup-shaped *Pezizas* is found. Besides the above, a few additional species of this order, which have hitherto remained undescribed, may occasionally be seen. Microscopic FUNGI, or moulds, are, as most people know, sufficiently abundant in Bombay during the wet season. The microscopic fresh water ALGÆ exist in great quantities in all the stagnant waters of the Presidency, and in damp situations. The green colour assumed by walls, after continuous rain, is due to the development of these minute plants ; and so is the green scum which frequently covers the surface of Vehár Lake. The all but entire absence of large Seaweeds or marine ALGÆ in the neighbourhood of the Western coast is remarkable. The few that do occur have as yet been hardly identified, much less studied in detail ; neither has there been a more intimate acquaintance formed with the Bombay fresh-water species of this great order.

The detailed account of the distribution of our indigenous natural orders throughout the Presidency having now been completed, a few general considerations, on the Bombay flora as a whole, will not be out of place ; without something of the kind, this paper would be simply a bare statement of facts, while the various interesting and important inferences to be drawn from such facts would thus be left unnoticed.

An examination of the manner in which the orders of the vegetable kingdom are distributed will show that more than half of them are represented in the flora of Western India. Certain orders are, as might be expected, much more largely developed than others ; about an eighth of the Dicotyledons, for example, may be referred to *Leguminosæ*, while one-fourth of the Monocotyledons belong to *Gramineæ*. Representatives of these two orders, together with species of *Acanthaceæ, Compositæ, Euphorbiaceæ, Rubiaceæ, Labiatæ, Convolvulaceæ, Scrophularineæ, Malvaceæ, Asclepiadeæ, Apocyneæ, Urticeæ, Amarantaceæ, Orchideæ*, and *Cyperaceæ* form fully five-eighths of the plants indigenous to the Bombay Presidency. It must, however, be remembered that, although they are greater numerically in indigenous species, the orders just mentioned are not those which are most largely represented in proportion to the total number of species contained in each. The great cosmopolitan order *Compositæ* for instance, which possesses upwards of 10,000 species, is represented here by probably something less than 100. *Rubiaceæ* might perhaps be cited as a less extreme example ; it contains 4,500 species, of which hardly more than 60 exist in our flora. These proportions will appear very small when compared with the number of species belonging to other orders : the little order *Aurantiaceæ* is a good case in point ; it contains only 100 species, out of which no less than 14 are indigenous to Western India. The orders then which are best developed here, in proportion to their total number of species, are *Convolvulaceæ, Aurantiaceæ, Asclepiadeæ, Apocyneæ, Malvaceæ, Capparideæ, Ebenaceæ, Meliaceæ, Jasmineæ, Urticeæ, Cucurbitaceæ, Commelynaceæ*, and *Zingiberaceæ*. It is noticeable, on the other hand, that several large tropical families, and one or two peculiar Indian orders, are almost, or even entirely, absent from

Western India. *Myrtaceæ,* a tropical order of 1,800 species, is represented here by only eight, and *Melastomaceæ,* comprising an equally large number, by five or six. There are twelve or fifteen indigenous species of *Liliaceæ,* an order of 1,500 members. *Dipterocarpeæ* and *Dilleniaceæ,* both Indian families, are represented by one and two species respectively. *Cycadeæ* are entirely absent. *Palmæ* are very deficient, only five species being indigenous. It is not easy to account for the absence of the large orders *Cruciferæ* and *Umbelliferæ* from the more temperate districts of the Presidency; of the former there is only one indigenous species known, and of the latter, but fifteen or sixteen. Notwithstanding the extent of the Bombay Presidency, its diversified surface, and its variations in climate and soil, it is impossible to characterise its flora as a very rich one; some might perhaps be tempted to call it poor. The whole flora, leaving out of consideration the minute *Cryptogamia,* contains under 2,000 species; and its comparative poverty may be realised when it is asserted that in other parts of India an almost equal number of species may be gathered within a radius of twenty miles, or less. The Deccan and the alluvial parts of Gujarát, like most other Indian plains, are exceedingly poor in species, and it is only in the more humid Ghát and Konkan districts that any considerable collection can be made. Except under very favourable circumstances, it is unusual to find a large number of different species assembled together within a limited space; it is common, on the other hand, to see, during the rainy season, an enormous number of individuals belonging to one or two annual species congregated within a comparatively small radius. Putting aside *Gramineæ* and *Cyperaceæ,* both essentially gregarious orders, this is notably the case with the various species of *Impatiens* and with some members of the order *Compositæ.* In the Konkan *Smithia sensitiva,* and in the Deccan *Heylandia latebrosa, Indigofera linifolia, I. glandulosa,* and *Cyanotis fasciculata* are amazingly abundant. As regards shrubs, trees, or perennial herbs, *Leguminosæ, Myrtaceæ, Labiatæ,* and *Acanthaceæ* present remarkable examples of this congregation of individuals. In Khándesh and Gujárát extensive tracts of country are covered with *Butea frondosa.* *Eugenia jambolana* exists in great numbers on the higher Gháts, and in the same localities, in even greater numbers, *Pogostemon purpuricaulis* forms nearly the whole undergrowth. *Neuracanthus sphærostachyus* sometimes covers entire hillsides, while two or three species of *Strobilanthes* are equally abundant. A large extent of country, too, may often be seen covered with Teak to the exclusion of nearly everything else. Two instances will show that this segregation of individuals in great numbers is not confined to indigenous plants. *Malachra capitata,* an American member of the *Malvaceæ,* and *Lagascea mollis,* a Mexican species of the *Compositæ,* spring up in perfectly incredible quantities during the rains, the one about Bombay and the other in the vicinity of Poona.

Let us now note a few of the conditions which take part in regulating the distribution of species to each botanical province. In tropical and sub-tropical climates the foremost and most important condition which influences vegetation is the amount of humidity in the air, the distribution of tropical plants being affected to a far

greater extent by the moisture of a climate than by its temperature or any other condition. In this part of India the amount of atmospheric moisture is, as a rule, in direct proportion to the nearness of the sea. So sensitive are plants to the degree of humidity, that it is no uncommon thing to find species, genera, or even whole natural orders confined within definite hygroscopic limits, causing, on a large scale, the greatest difference between the vegetation of moist and dry climates, and a corresponding diversity in the aspect of a country. Of this fact numerous instances occur in Western India; some plants, notably the *Zingiberaceæ* and epiphytal *Orchideæ*, which require a constantly humid atmosphere, are almost entirely confined to the Konkan, the Ghát districts, and Kánara. One species of the latter order extends as far as the Khándesh and Gujarát forests. The *Anonaceæ, Melastomaceæ,* and *Piperaceæ*, of the Bombay flora, are also limited to the moister localities; other plants are confined to regions of perennial drought, while a third class is dependent on alternations of heat or drought, and moisture. The amount of rainfall has far less influence; a district covered with vegetation may often be noticed where the air is found saturated with moisture; although the precipitation is but scanty when compared with that of other places which possess a growth of inferior luxuriance. The temperature has a much smaller influence than might be supposed on the development of a tropical flora; an equable, though comparatively low temperature, combined with a humid atmosphere, is especially favourable towards the growth of vegetation, and it is this combination of circumstances, occurring however to a less degree here than in the insular climates of other parts of the tropics, which produces the comparatively luxuriant vegetation, or tropical flora, of Kánara and the Southern Gháts and Konkan. In the strict sense of the expression, however, no district of Western India can be called perennially humid, such a condition as is experienced in Ceylon and in parts of Burma and Eastern Bengal. On the contrary every part of this Presidency presents more or less contrasted seasons of excessive moisture and excessive drought. It is during the warm season of great moisture that the annual species of the Bombay flora make their appearance. Many of these are uniformly dispersed over a great part of the Presidency, seemingly regardless, in their distribution, of any influence but moisture. A second class appear to be affected, in addition, by elevation, some of these being found only in the Konkan and low-lying country, whilst others occur nowhere except in the more elevated districts; all, however, agreeing in the circumstance that their existence is dependent on the annual return of the rainy season. A great degree of heat, with little moisture, characterises the climate of part of Gujarát and the Deccan, and produces, in some districts at least, what is termed a Desert Flora. In no part of the Presidency are great extremes of heat and cold known; snow is unheard of, and frost, except in the most northern parts, is never seen.

Another condition which exercises a powerful influence over distribution is elevation. Its effects can be studied to advantage in the Ghát flora, where, from below upwards, successive groups of species may be seen to appear and disappear, their places being occupied by others, until, finally, the vegetation at the greatest altitude presents

totally different characters to that growing on the plain below, palms and other tropical plants flourishing here, while above may be seen, existing in full luxuriance, *Pteris aquilina* and *Osmunda regalis*, both indigenous ferns of temperate Britain.

Differences in soil and geological formation affect distribution to some extent. In the black cotton soil of Gujarát and parts of the Deccan and Khándesh are found plants for which we may search in vain on the red soil of other districts. The flora of the Ratnágiri Collectorate is richer and more varied than that of any other part of the Presidency, and this fact is doubtless to be attributed to the diverse character of its soils. The degree of exposure has also a certain influence on distribution. Numerous species occur only in the deep shade of the forest or in the dark ravines and valleys of the Gháts; others are found nowhere except in the bleakest and most exposed situations.

The consideration in greater detail of the special botanical features of each province, the variation and development of species as affected by climate and geographical position, as well as the geographical alliances and affinities of the Bombay flora with those of other countries would appear to demand, in a paper like this, a fuller notice than they have received : but the materials for a useful discussion on these points are still so imperfect, and the amount of research and labour needed for the collection of suitable material is so great, while at the same time the necessary opportunities are non-existent, that I am compelled to forego such observations as I had originally proposed to offer on this part of the general subject. The article may now be regarded as complete so far as it is in my power to render it so.

W. GRAY.

GUJARÁT TREES.

GUJARA'T TREES[1].

FRUIT TREES.

No.	English name.	Botanical name.	Vernacular name.
1	Mango	Mangifera indica	*A'mbo.*
2	Mhowa	Bassia latifolia	*Mahudo.*
3	......	Mimusops indica	*Ráyan.*
4	Tamarind	Tamarindus indica	*A'mli.*
5	......	Eugenia jambolana	*Jámbudo.*
6	Jujube	Zizyphus jujuba	*Bordi.*
7	Emblic myrobalan	Phyllanthus emblica	*A'mla* or *ávla.*
8	Custard apple	Anona squamosa	*Sitáphal.*
9	Wood apple	Feronia elephantum	*Kothi* or *kavit.*
10	Bel	Ægle marmelos	*Bili.*
11	......	Carissa carandas	*Karamda.*
12	......	Diospyros montana	*Timru.*
13	......	Diospyros melanoxylon	*Támrug.*
14	......	Buchanania latifolia	*Chároli.*
15	......	Citrus acida	*Limbu.*
16	......	Citrus limetta	*Mitha limbu.*
17	......	Citrus limonum	*Kadva limbu.*
18	......	Citrus medica	*Kavli.*
19	Pomelo	Citrus decumana	*Chakotru.*
20	Orange	Citrus aurantium	*Nárangi.*
21	......	Averrhoa carambola	*Kamrakh.*
22	Pomegranate	Punica granatum	*Anár* or *Dáhdam.*
23	Fig	Ficus carica	*Anjir.*
24	Mulberry	Morus indica	*Setur.*
25	Sweet sop	Anona reticulata	*Rámphal.*
26	Papaw	Carica papaya	*Papáu.*
27	Jack fruit	Artocarpus integrifolia	*Phanas.*
28	Cocoanut palm	Cocos nucifera	*Nárel* or *náriyali.*
29	Almond	Amygdalus communis	*Badám.*
30	......	Cicca disticha	*Harfá-revdi.*
31	Betelnut	Areca catechu	*Sopári.*
32	Plantain	Musa sapientum	*Kel.*

No. 1. Mango; Mangifera indica, *ámbo*. The mango, cultivated in all parts of the province both for its shade and for its fruit, is found near villages and in gardens.

The tree yields a gum and its bark is considered a valuable dressing for boils, and is used with that of the babul and *rohan* for dyeing cloth to a reddish brown. The leaves wrapped round tobacco are used as cigarettes. Its light-coloured timber not being durable is used only for the planking of ceilings, door panels, and for cheap packing cases. In its unripe state, when it is called *marva*, great quantity of mangoes are pickled. The ripe fruit, *keri*, is much eaten by all classes both at private dinners and at caste feasts. In larger towns, assemblies of as many as a thousand people sometimes meet together to feast on mangoes. On this occasion the fruit is first pressed by the hand, and the juice strained though a cloth is mixed with clarified butter, *ghi*, and distributed to the guests. A

[1] Compiled from materials supplied by Mr. G. H. D. Wilson, C.S., and Lieutenant-Colonel J. G. McRae.

favourite form of caste dinner consists of mango juice, with wheaten cakes and vegetables of different sorts.

No. 2. Bassia latifolia, *mahudo*. The *mahudo*, which is one of the most useful of forest trees, is only found in the eastern Gujarát. The flowers of this tree form a principal article of food for the rude tribes residing in the Gujarát forests, especially those of Rewa Kántha, and a scarcity of the *mahuda* crop is as severely felt by them as a failure of the grain crop in the more highly cultivated parts of the province.

Besides forming an article of diet the flower of the *mahuda* is used in the manufacture of spirits, and for this purpose large quantities are yearly exported from Gujarát, chiefly to Bombay and Káthiáwár. When set apart for the manufacture of spirits the flowers are first allowed to dry and then soaked in water in the proportion of forty pounds of the flower to fifty pounds of the water. Here they ferment, and are generally left in this state for eight or nine days. While the dried flowers are fermenting the still is being made ready. This apparatus consists of four parts. First, there is a copper boiler with a somewhat narrow mouth; second, a shallow bowl-shaped copper vessel laid on the mouth of the boiler; third, a funnel-mouthed pipe, its broad end within the boiler, and as it narrows passing out through an opening in the boiler's side and stretching for some inches beyond; and fourth, a separate copper vessel or receiver. When eight or nine days have passed, and fermentation has ceased, the liquid is poured into the boiler, the hollow rounded lid laid in its place and filled with cold water, the broad end of the tube placed below the centre of the bottom of the lid, the opening in the side of the boiler made carefully air-tight, and the receiving vessel set below the outer end of the tube. Fuel is now collected below the boiler and set alight, and as the liquid grows warmer steam rises, and, condensing on the cold surface of the lid, falls in drops into the broad mouth of the tube, and passing outwards through the pipe, flows from its outer end into the receiving vessel. The contents of the receiving vessel produced by this single distillation are weak, used only by the poorer classes. The *mahuda* spirit ordinarily drunk is made from this once distilled liquid mixed with an equal quantity of fermented *mahuda* and again distilled. For the best varieties of spirit the *mahuda* is twice distilled. To give these stronger drinks an agreeable flavour, dried rose leaves and raisins are sometimes mixed with the *mahuda*, and to impart a red colour chips of the *pattang*, Cæsalpinia sappan, tree are also sometimes thrown in.

The berry of *mahuda* is not much eaten. But from the seeds a useful oil known as *doliyu* is prepared. Among other uses this *doliyu* oil is employed at the town of Kapadvanj in the Kaira district in the manufacture of soap. In preparing this soap the oil is placed in a large vessel, and over it water mixed with carbonate of soda, called *us*, is poured. The vessel is then heated, and for the space of eight or nine hours the mixture of oil, water, and carbonate of soda is constantly stirred by a long wooden ladle. A tap in the lower part of the vessel is then opened and the water allowed to drain off. Fresh carbonate of soda is then poured in

and the process repeated. This goes on for three days, the furnace being kept burning all the time. At the end of the third day the oil becomes incorporated with the carbonate of soda and assumes a thick consistency. The vessel is then taken off the fire and the thick substance poured into masonry tanks and there mixed with a salt earth called *kháro*. Afterwards it is taken out and made into cakes, which when dried in the sun are ready for sale.

The timber, which is of a light colour, is used for building purposes. It is not, however, of any very great value, as, besides being neither strong nor durable, it is very liable to the attacks of insects.

No. 3. Mimusops indica, *ráyan*. The *ráyan* though found in all parts of Gujarát is most common in the northern districts. It gives a dense shade and at the end of the hot weather months (May) bears a profusion of bright yellow berries called *ráyan*. These are sweet and nutritious, but somewhat heating and indigestible if largely eaten. The Kolis of Northern Gujarát, who during this season live almost entirely upon these berries, take draughts of whey to counteract any ill effects. When dried the berries called *kákadia* will keep good for more than six months. From the seeds an oil is extracted which is used for burning. The timber of a light pinkish brown colour is tough and hard. Cart wheels, ploughs, and oilmen's presses are made of it, and it is especially useful for the framework of wells, having an unusual power of resisting the action of water. The *ráyan* is said by the natives to be one of the longest lived of their trees, not yielding fruit till it is fifty, and remaining strong and vigorous for 500 years. In appearance and fruit this tree reminds one of a well-grown olive.

No. 4. Tamarind, Tamarindus indica, *ámli*. The tamarind is found throughout the province, sometimes singly, in other places, chiefly on the sites of Musalmán burying grounds, in large groves. The acid fruit is extensively used in native cookery and the pulp for the manufacture of cooling drinks. The leaves are given as fodder to cattle and are supposed greatly to increase the amount of milk given by cows. Though considered inferior to babul, the wood being hard and dense is good for fuel, and is also made into oil-presses and sugar-rollers. As it is very liable to the attacks of insects, it is not however used for house-building. The *ámli* is also considered to be haunted by spirits, and is worshipped in Jámbughoda on a day called *Ámli Agiáras*. There is a red-fruited variety, Pithelocobium dulce, which affords a superior *sharbat*.

No. 5. Jambul, Eugenia jambolana, *jámbudo*. The jambul, except in Northern Gujarát where it is rather scarce, is found near villages and in gardens in all parts of the province. Its light grey bark and bright green oval leaves, with its drooping habit of growth, make this one of the most ornamented of trees, while its shade is good and its fruit wholesome. The berries are eaten largely and in the monsoon season (June and July) sold extensively in almost all markets. The fruit of another variety called *Páras Jámbudo* is much larger than that of the common jambul, and the

wood is said to be excellent for building purposes. Jambul timber is, however, but little used in Gujarát. Its bark is astringent, and yields a gum resin.

No. 6. Jujube, Zizyphus jujuba, *bordi*. The *bordi* is one of the commonest fruit trees, found near villages and on cultivated as well as on waste lands. It is a low-growing wide-spreading tree, in form not unlike the English apple and producing berries much resembling those of the Siberian crab apple. The fruit is offered for sale in almost all markets during the cold season (December and January) and is much eaten. Being a thorn-bearing tree the natives hold its wood unlucky, and for this reason, though in itself tough-grained and strong, the timber is but little used for house-building purposes.

No. 7. Phyllanthus emblica, *ávla* or *ámla*, is a common jungle tree, occasionally seen in cultivated land and near villages. Its round three-ribbed astringent tasted fruit like a green gooseberry forms a good preserve, and when pickled is a favourite dainty among natives. On account of a peculiar flavour it imparts, some of the forest tribes eat it before drinking water. It is also used in washing. The bark being strongly astringent is sometimes used in diarrhœa, and, like the bark of the *kher* tree, said to be capable of yielding *káth*. This tree though found throughout Gujarát, is more frequent in the Panch Mahals jungles, and is remarkable for its graceful plume-like foliage.

No. 8. Custard apple, Anona squamosa, *sitáphal*. The custard apple, though seldom growing to the size of a tree, is important for its fruit's sake. Originally an exotic the custard apple has long been naturalized in Gujarát, and where the soil is *gorádu* or light yellow, is found growing wild in the hedges and waste lands. The fruit is extensively sold in all markets.

No. 9. Wood apple, Feronia elephantum, *kothi* or *kavit*. The wood apple, a tree of elegant growth, though yielding but scanty shade, is found throughout the province both in cultivated and uncultivated lands. The pulp of its fruit is relished by the natives as an article of food, and is also given medicinally in cases of diarrhœa and dysentery as an astringent. Its light-coloured timber is strong and hard, but, as it is wanting in lasting qualities, it is not much used.

No. 10. Bel tree, Ægle marmelos, *bili*. Like most of the orange family the bel tree is very ornamental, and, though rather scarce in the more populous parts of the province, is common in the Panch Maháls. It is the astringent rind of the fruit which is valuable in diarrhœa and dysentery. The pulp is not astringent, and its only effect is that of an antiscorbutic, and as such it is of value in cases of scorbutic dysentery. The pulp of limes or oranges would do quite as well. The value of the pulp contained in its fruit as a medicine in cases of dysentery and diarrhœa is well established. Its hard light yellow wood is sometimes used for native oil-mills, but is not durable enough for house-building. The tree bears a sacred character among Hindus, and is seldom cut except by the lowest classes of the people. Its ternate leaf, an emblem of the Hindu trinity, is much esteemed as an offering to Mahádev, and for this reason the tree is often planted near shrines and other holy places.

No. 11. Carissa carandas, *karamda*, is a thick bush common in the Surat and Panch Mahály jungles, particularly on hill-sides and the banks of rivers. Its glossy leaf and profusion of bright star-like sweet-scented little blossoms make it a great ornament to the scenery. Its purple fruit of the size of a sloe is much eaten by the natives when ripe and is also used as preserves. Europeans prefer it plucked just before it is ripe, when it affords a delicious taste reminding one of green gooseberries. In the parts of Gujarát, not mentioned above, it is generally found in gardens where it is developed into a larger variety having fruit as big as an olive.

No. 12. Diospyros montana, *timru*. This tree, though not widely distributed, is common in the Panch Maháls forests. The fruit is eaten and much relished by the forest tribes, but is seldom offered for sale in the market. It has a very hard strong wood, but, except for cart poles, is not much used. The fact that it is not durable, that it suffers from the attacks of insects and cannot be crested, takes away from the value of its timber. The centre or heart-wood, which is very small, is ebony of an inferior kind; but, except that it is turned into wooden bracelets, it is apparently not known in trade. Except in the size of its fruit, which is as large as an apple, it is scarcely distinguishable from No. 13, Diospyros melanoxylon, *támrug*, whose fruit is of the size of a plum. The heart-wood of both affords an ebony. The fruit is gathered chiefly by the Náikdás and brought into the *bazár* at Godhra and Hálol for sale.

No. 14. Buchanania latifolia, *chároli*, is found sparingly in the Panch Maháls jungles, more frequently about Jámbughoda in the Nárukot State. A small tree with pretty foliage; the berry is eaten by the natives. Found in forests it does not appear to be cultivated in gardens, though its fruit is marketable. The kernels are extensively used in native confectionery.

No. 15. Citrus acida, *limbu*; No. 16. Citrus limetta, *mitha limbu*; No. 17. Citrus limonum, *kadva limbu*; found in gardens throughout Gujarát, are well known. No. 15 is used in pickles, dyeing, &c.

No. 18. Citrus medica, *kavli*, is found in gardens, but not common.

No. 19. Pomelo, Citrus decumana, *chakotru*, found only in gardens, is not worth eating.

No. 20. Orange, Citrus aurantium, *nárangi*, is not common, found in a few gardens only, does not thrive, and the fruit consists of mere abortions.

No. 21. Averrhoa carambola, *kamrakh*, is found in gardens; not common throughout. Handsome in its dark green glossy leaves, clusters of small pale rose-coloured flowers, and deeply-ribbed amber fruit largely eaten. Acid juice of the fruit is said to remove iron moulds from linen.

No. 22. Pomegranate, Punica granatum, *anár* or *dáhdam*, is not common; found in a few gardens only. The fruits of the Dholka sub-division in Ahmadabad are much esteemed. The astringent rind sometimes used in dyeing yellow.

No. 23. Fig, Ficus carica, *anjir*. Found in gardens. Fruits largely eaten.

No. 24. Mulberry, Morus indica, *setur*. Found in gardens; not common.

No. 25. Sweet sop, Anona reticulata, *rámphal*. Found in gardens.

No. 26. Papaw, Carica papaya, *papáu*. Common in gardens throughout Gujarát; fruit when green is made into a good imitation of apple tart. Its juice when ripe is said to make tough meat tender.

No. 27. Jack, Artocarpus integrifolia, *phanas*. Not very common, only found in gardens and near habitations. Fruits of value eaten largely. Fine yellow-coloured hard wood used for furniture and planks.

No. 28. Cocoanut palm, Cocos nucifera, *nárel* or *náriyali*, is only to be found in gardens and compounds attached to temples and shrines, and grown as a curiosity. Leaves used for thatching, husk of fruit used for the coir of commerce,—fruit well known. It is both eaten and used for extracting oil.

No. 29. Amygdalis communis, *badám*, is only found in gardens, not common. Kernel of nuts eaten. Grown for curiosity. Tooth brushes made of its twigs are said to be good for toothache.

No. 30. Cicca disticha, *harfá-revdi*. Found only in gardens. Fruit eaten and preserved.

No. 31. Areca catechu, *sopári*. Not common. Found in pleasure gardens. Nut eaten with *pán*; wood used for walking sticks.

No. 32. Plantain, Musa sapientum, *kel*. Is plentiful in Surat; but although gardens exist there are none grown fit to eat in the rest of Gujarát.

FLOWERS AND FLOWERING TREES.

No.	English name.	Botanical name.	Vernacular name.
33	....	Michelia champaca (yellow) .. .	*Ráe champo.*
34	....	Plumieria acuminata	*Khad champo.*
35	....	Tabernæmontana coronaria	*Tagar.*
36	Shoe-flower..	Hibiscus rosa sinensis	*Jásvant.*
37	....	Bauhinia purpurea	*Krashdvali* or *devkánchan.*
38	Oleander	Nerium odorum	*Karen.*
39	Rose	Rosa centifolia	*Guláb.*
40	Varieties of jessamine	Jasminum grandiflorum	*Champeli.*
41	Do.	Do. sambac	*Mogro.*
42	Marvel of Peru	Mirabilis jalapa	*Gulbás.*
43	Marygold	Tagetes patula	*Gulchadi.*
44	Basil	Ocymum sanctum	*Tulsi.*
45	....	Cassia fistula	*Báva* or *garmála.*
46	....	Wrightia tinctoria	*Kálo kado.*
47	....	Wrightia tomentosa..	*Dudhi.*
48	....	Erythrina suberosa	*Rán pángára.*
49	....	Bombax malabaricum	*Shimal.*
50	....	Albizzia stipulata	*Shembar.*
51	....	Dolichandrone falcata	*Netarsingi.*
52	....	Morinda exerta	*Alri.*
53	....	Parkinsonia aculeata	*Devi bábul.*
54	....	Poinciana pulcherrima	*Sankeshvar.*
55	....	Poinciana elata	*Vâyni.*
56	....	Mimusops elengi	*Borsali.*
57	....	Agati grandiflora	*Agathio.*

No. 33. Michelia champaca, *ráe champo*. Not common; found in gardens only. An ornamental tree with very strong scented yellow flowers. They are used by males for wearing in turbans and by females they are worn in the hair. They are also offered to idols. Fine timber; but not used, probably because the tree is considered sacred.

No. 34. Plumieria acuminata, *khad champo*. Found only in gardens and near habitations. Looks remarkably odd in the cold weather when the gouty-looking stems are bare, but pleasing during the hot and rainy seasons when it bears at their extremities bunches of white and strongly fragrant flowers, with a yellow eye and surrounded by deep green lance-shaped leaves. Its soft useless wood looks hard and strong, but is not used as timber.

No. 35. Tabernæmontana coronaria, *tagar*. A favourite garden shrub, its sweet-scented white flowers are common as a decoration to the hall dress in Europe.

No. 36. Hibiscus rosa sinensis, *jásvant*, has a large handsome crimson flower, the juice of which was used to blacken leather. Hence the name shoe-flower.

No. 37. Bauhinia purpurea, *kraskávali* or *dev-kánchan*. A very beautiful tree when in bloom, being covered with rose-coloured sweet-scented flower in shape like that of a French Geranium (prop. Pelargonium). These are offered at the temples; not uncommon in gardens where it grows into a fair-sized tree.

Nos. 38, 39, 40, 41, 42, 43, 44 are all cultivated plants.

No. 45. Cassia fistula, *garmála* or *báva*. Forest tree. Very beautiful when in flower; looking like a gigantic laburnum. Young leaves are used as a remedy for itch—the soft matter inside the pods used medicinally and known in commerce. Bark of the root used as a purgative. Found wild most plentifully about the Pávágad Hill—more sparingly throughout the Panch Mahéls jungles. Very rare in other parts of Gujarát.

No. 46. Wrightia tinctoria, *kálo kado*, has handsome clusters of white jasmine-scented flowers with a long tube to the corolla; a garden plant; its height and habit of growing are like that of a pear tree, and blooming it shows also a mass of white blossoms. These, however, when examined more nearly prove to be flowers resembling jasmine, but larger and in branches of 10-12, or even 15, and throwing out a beautiful scent. Blossoms much esteemed as offerings at temples. Although found in Kaira gardens, is abundant throughout the Panch Maháls forests.

No. 47. Wrightia tomentosa, *dudhi*, has flowers also white, but of a more delicate make without the long tube of the last and with a peculiar spicy scent. Found only in the Panch Maháls, especially in the rocky hills in close forests.

No. 48. Erythrina suberosa, *rán pángára*. Common on the sides of the Pávágad Hill and the neighbouring jungles. Occasionally found in other parts of the Panch Maháls and in Kaira near the

Mahi. Conspicuous for the spikes of brilliant scarlet flowers it bears at the end of every branch just before its leaves begin to shoot; distinguishable from the Erythrina indica so frequent on Malabár Hill and in the Deccan by its sharp thorns and smaller leaves.

No. 49. Silk-cotton tree, Bombax malabaricum, *sainay* or *shimal*. It also bears its fleshy crimson blossoms before the shooting of its leaves, and is then a great ornament to the landscape. The silky down from its pods is much valued for stuffing pillows, cushions, and mattresses, which are then more luxuriously soft than those stuffed with ordinary cotton. Its light and soft wood is used for troughs, water conduits, canoes, wooden platters, and sword scabbard.

No. 50. Albizzia stipulata, *shembar*. Has large flowers of a beautiful pink, and is not uncommon in the Panch Mahâls jungles.

No. 51. Dolichandrone falcata, *netarsingi*. Has pretty white fritted flowers and grows to a fair size in the Panch Mahâls jungles.

No. 52. Morinda exerta, *alri* or *álan*. The fruit is eaten pickled; from the bark of the root a yellow dye is extracted, and its wood, a very pretty bright yellow in colour, appears suitable for turning. But it is most noticeable in April and May for its profusion of waxen-white sweet-scented flowers.

No. 53. Parkinsonia aculeata, *devi bábul*, occasionally found in waste lands and borders of fields. When in flower with its long drooping plumes of blossoms clear yellow touched with red, it is very pretty, but for the greater part of the year it is a ragged looking plant hardly reaching to the dignity of a tree.

No. 54. Poinciana pulcherrima, *sankeshvar*. There is no doubt that this tree is a Poinciana. It could answer the description of Poinciana elata in Dalz, since it has white flowers turning to yellow, but it wants the lax purple filament. It must, therefore, be a distinct variety; met with in Kaira here and there about the outskirts of villages, but it grows wild in the jungles.

No. 55. Poinciana elata, *váyni*. This is the real Poinciana elata to be found in the Bhadar at Ahmadabad and near Godhra, and in the neighbourhood of villages in Kaira; but is rare.

No. 56. Mimusops elengi, *borsali*. Not a lofty but a very handsome tree with spreading branches and dark green shining leaves, sweet-scented small blossoms, and berries of which natives make a preserve. The wood strong and durable. Found very rarely in gardens.

No. 57. Agati grandiflora, *agathio*. Not seen in forests; common. The large rose-coloured and white flowers are shaped like those of a sweet pea and smell like a fresh apple. They are much used by the natives as offerings at shrines. Also they as well as the pods are eaten in pickles and made into curries. Though very erect the *agathio* is hardly large enough to be called a tree.

TIMBER TREES.

No.	English name.	Botanical name.	Vernacular name.
58	Teak	Tectona grandis	*Ság* or *ságván.*
59	Blackwood	Dalbergia sissoo	*Sisam* or *sissoo.*
60	......	Adina cordifolia	*Aladhvan.*
61	......	Stephegyne parviflora	*Kalam.*
62	......	Ougeinia dalbergioides	*Tivas* or *tanach.*
63	......	Terminalia tomentosa	*Ain.*
64	......	Pterocarpus marsupium	*Bio* or *bibla.*
65	......	Schrebera swietenioides	*Moka.*
66	......	Acacia kerek	*Kathi* or *kegar.*
67	......	Schleichera trijuga	*Kosamb.*
68	......	Albizzia odoratissima	*Kálosaras.*
69	......	Grewia asiatica	*Dháman.*
70	......	Gmelina arborea	*Shevan.*
71	Babul	Acacia arabica	*Bával.*
72	......	Dalbergia paniculata	*Pasi.*
73	......	Anogeissus latifolius	*Dhávda.*
74	......	Briedelia montana	*Asanna.*

No. 58. Teak, Tectona grandis, *ság* or *ságván.* Though the teak is found in the Panch Mahals forests and in some parts of the Surat district, all large teak logs come from the Dángs. The timber of this tree useful for nearly every purpose is for all works requiring strength and size by much the best wood grown in Gujarát. The timber is light in colour with a reddish brown tinge near the heart of the tree ; strong, very durable, and not too heavy.

No. 59. Blackwood, Dalbergia sissoo, *sisam* or *sissoo.* Blackwood is pretty widely distributed over the whole province, but is common only on the slopes of the eastern range of hills. As compared with the forests of Southern India the blackwood of Gujarát attains no considerable size. Logs eighteen inches in diameter are seldom met with. The timber is of a very dark colour, strong and durable. It is used for furniture, for carriages and carts, and very seldom in house-building for uprights. It is too heavy to be commonly used for other purposes.

No. 60. Adina cordifolia, *aladhvan.* This tree though pretty widely distributed attains a considerable size only in the Dáng forests. Not found in Kaira or Ahmadabad; it is very frequent in the Panch Mahál. The timber, which is light yellow in colour, is neither very strong nor very durable. Its chief use is in house-building for panelling.

No. 61. Stephegyne parviflora, *kalam.* Very similar to *aladhvan*, but not nearly so extensively used. Common in the Panch Mahals. Wood reddish-coloured, close-grained and good for gunstocks.

No. 62. Ougeinia dalbergioides, *tanach.* Large logs are not procurable, as the tree does not grow to any size and is seldom free from flaws. This, which is very tough wood of a light colour, is used for poles of country carts and is suited for purposes in which strength, toughness, and comparative lightness are required.

No. 63. Terminalia tomentosa, *ain.* Though found in almost all the wilder parts of the province, this tree grows to no great height except in the Dángs.[1] The bark is used by Bhils to poison

1. There are not a few fine *ain* trees in the Panch Mahals forests.

fish. The timber is dark reddish brown in colour and in texture is very hard, heavy, strong, and durable. It is used in house-building, but on account of its weight, is rather objected to.

No. 64. Pterocarpus marsupium, *bio* or *bibla*. This tree is found only in large forest tracts. To get at the leaves, an excellent fodder, professional cattle-breeders often do great damage to these trees. Its timber is valuable for building purposes, being second only to teak.

No. 65. Schrebera swietenioides, *moka*. The tree grows to a good size though not very common in the Panch Mahals. Its timber is hard, strong, and tough; not used in house-building. Makes excellent cart wheels.

No. 66. Acacia kerek, *kathi* or *kegar*. The timber of this tree, which in colour is very dark, is heavy, strong, and hard. It is not much known, its weight preventing it from being generally used. Except in colour it is very similar to *kher* and may still prove to be as valuable.

No. 67. Schleichera trijuga, *kosamb*. Except in the Dáng forests this tree grows to no size. It yields lac. The timber is very hard and strong, considered unequalled for the naves and axles of cart wheels. It is, however, seldom if ever offered for sale in the market.

No. 68. Albizzia odoratissima, *kálosaras*. So called probably from its heartwood being almost black while the outer wood is white. It grows freely, gives a tolerable though not a dense shade, and is on the whole an ornamental tree. Bark brown; wood hard and strong, used for cart wheels; not much known in trade, nor preserved as timber by the Forest Department. Bark used for embrocations. The leaves boiled and applied externally are considered a remedy for rheumatism. The blossoms, which appear like tufts of green worsted, give out a most delicious apricot-like scent. The timber takes a fine polish and is good material for desks or work-boxes.

No. 69. Grewia asiatica, *dhdman*. Does not grow to any large size, but is well known in trade. Has an edible fruit of a pleasant acid taste. The wood is light and strong, and is valued for shafts of carriages. Found in the Panch Mahals forests.

No. 70. Gmelina arborea, *shevan*. The fruit is eaten by goats and cattle. The wood very light both in colour and weight is used for furniture and ordinary purposes; is first rate for carriage parcels. It is well known in trade. Found in the Panch Mahals forests. A large tree conspicuous for its abundant and beautiful yellow flowers.

No. 71. Babul, Acacia arabica, *bavál*. Is the most useful tree and found throughout the province. The pods while green are a first-rate fodder for fattening sheep and goats. The tree yields an inferior gum arabic, the bark is much used in tanning, and when mixed with that of the *ráyan* and *mahuda* gives a fine brown dye. In the Surat district it is the practice for cultivators to set apart

some of their land for the growth of the babul. In all parts of the province its growth is encouraged on the edges of fields, not only for fuel, but because of the value of its timber for the manufacture of all sorts of agricultural implements. The wood is considered second only to *kher*, and is used for making carts, oil-mills, sugar-rollers, house beams, and other articles where great strength is required.

No. 72. Dalbergia paniculata, *passi*. A fine and rather graceful tree scattered sparsely about the Panch Mahâls jungles, giving a light-coloured strong wood.

No. 73. Anogeissus latifolius, *dhávda*. This tree yields a perfectly white gum known in trade, but not of much value. The wood is light in colour and very hard. It is used for the axles of country carts, but not for general purposes. Its gray bush and graceful habit of growth make it an ornament of the forest.

No. 74. Briedelia montana, *asanna*. A good timber tree found in the Panch Mahâls jungles, in appearance something like a jámbul.

AROMA AND SPICE-PRODUCING TREES.

No.	English name.	Botanical name.	Vernacular name.
75	Sandal wood	Santalum album	*Chandan.*
76	......	Boswellia serata	*Gugal.*
		DYE PIGMENT AND TAN-YIELDING TREES.	
77	Nyctanthes	Nyctanthes arbor-tristis	*Párijátak.*
78	Bastard teak	Butea frondosa	*Khákhro.*
79	Catechu tree	Acacia catechu	*Kher.*
80	......	Terminalia belleriea	*Beheda.*
81	......	Woodfordia floribunda	*Dhávri.*
82	... ..	Soymida febrifuga	*Rohan.*

No. 75. Sandal tree, Santalum album, *chandan*. Is found sparingly in the fields in Kaira and Panch Mahâls. Found wild here and there in the hedges—not common. Wood inferior in size, but certainly not so in quality to the sandalwood of Mysore.

No. 76. Boswellia serata, *gugal*. Yields a sort of resin in great abundance. The wood, which is very light and soft, is made into wooden platters. The resin is used by natives as incense in religious rites, and a stake cut from this tree is set in the ground where a marriage takes place amongst Bhils.

No. 77. Nyctanthes arbor-tristis, *párijátak*. Found only in gardens and near habitations. A tree from 10 to 30 feet high covered each night in the rains with star-like white flowers with orange centre having a delightful honey-like fragrance. These drop off each morning. The stem of the flower yields a yellow dye which is much used in dyeing turbans.

No. 78. Bastard teak, Butea frondosa, *khákhro*. The bastard teak well known for its mass of strange scarlet flowers is found throughout the province, but is especially common in its less cultivated parts. Though its wood does not serve for timber, this is one of the most generally useful of trees. From its leaves are

formed the cups and platters used at their meals by almost all high class Hindus. The flowers yield a yellow dye known as *kesudina ful*, the same which in the form of a yellow decoction is much used at *Holi* time. The tree is well suited for the production of lac besides yielding a valuable red gum. The seed of the beans is known as *palas pápda* and used medicinally as a cure for worms. The fibre of its roots is well suited for the manufacture of ropes.

No. 79. Acacia catechu, *kher*. This tree is very common in the Dáng, Panch Maháls, and Rewa Kántha forests. Its most important product is the astringent extract called *kátho*, Terra japonica, commonly eaten with betel leaves. The preparation of this extract, which further south has given their name to the Káthkaris or Káthodis of the Thána hills, furnishes employment to several of the forest tribes of Eastern Gujarát. The mode of preparing this extract varies to some extent in different parts of the province. In the Rewa Kántha forests branches of the *kher* tree stripped of their bark are chopped into small pieces between three and four inches long. These are then thrown into earthen pots filled with water and boiled until the greater part of the water evaporates. The thick sticky substance remaining in these earthen pots is next placed in a small bamboo basket set over the mouth of a narrow hole about five or six feet deep. Here the decoction is allowed to strain. When the straining process is complete the hard useless portions are left in the basket above, the watery part passes off soaking through into the earth, and the valuable extract is found in the pit and placed on leaves in the sun to dry.

In the Dáng forests in the south-east of Gujarát a slightly different process is adopted. The heartwood is cut into chips by the men and the boiling is superintended by the women. Each woman has in front of her two rows of six pipkins each in which the chips are boiled ; in the centre are two large pots, into which the concentrated *káth* from the smaller pots is collected ; here it is allowed to thicken still more, and finally is extracted in portions as large as can be taken up in the fingers and left to dry in the sun. The people who make the *káth* are of a low race and filthily dirty, and the dirtiness of the people is rivalled by the dirtiness of the process.

Besides this artificial product the *kher* tree yields a bright amber-coloured gum valued for its astringent properties. The bark is used in tanning and dyeing, and by Bhils for poisoning fish. The timber is red in colour and of excellent quality, being durable, hard, strong, and heavy. Though from its somewhat crooked habit of growth good *kher* logs are seldom obtained, yet for beams driven into the ground, piles left to stand in water and generally where wood work is likely to be much exposed to the weather this timber is prized. For burning purposes it is also valued both as firewood and in the manufacture of charcoal.

No. 80. Terminalia bellerica, *beheda*. A very large and handsome forest tree. The fruit, the myrobalans of commerce, is used in tanning leather and by the Bhils to poison fish.

No. 81. Woodfordia floribunda, *dhávri*. From the blossoms of this small tree a red dye is extracted.

No. 82. Soymida febrifuga, *rohan*. Chárans and other cattle-breeders feed their buffaloes on the fruit of this tree. From the bark a purple brown dye is obtained. Its timber is dark in colour and strong, but as it is too heavy for general purposes it is seldom used.

OTHER USEFUL TREES.

No.	English name.	Botanical name.	Vernacular name.
83	....	Holarrhena antidysenterica	*Kada.*
84	....	Bauhinia racemosa	*Jengi, asotri,* or *asindro.*
85	....	Prosopis spicegera	*Samdi.*
86	....	Moringa pterygosperma	*Sekto* or *saragvo.*
87	Bamboo	Bambusa arundinacea	*Váns.*
88	....	Murraya kœnigii	*Mitho limdo.*

No. 83. Holarrhena antidysenterica, *kada*. The seed of this tree called *indra jav* is used medicinally as a cure in cases of worms.

No. 84. Bauhinia racemosa, *jengi, asotri* or *asindro*. Is a pretty tree though never of large growth. The leaves are famous, for the country cigarette is generally made of tobacco rolled up in them. At the *Dasera* festival, natives give each other leaves of this tree, calling them gold. The wood both light and strong is used for legs to native cots.

No. 85. Prosopis spicegera, *samdi*. This common tree, in appearance not unlike a leafless babul, grows to no great size. Its pods are edible and its timber useful for curbs in well-sinking. This is one of the sacred trees of the Hindus. It is worshipped on the *Dasera* festival (October), because on a tree of this kind the five Pándav princes hung up their arms when they entered Virát Nagri in disguise. On the tree the arms turned to snakes and there remained untouched till the owners came back to claim them.

No. 86. Moringa pterygosperma, *saragvo* or *sekto*. There are two varieties of this tree, one with sweet and the other with bitter pods. From the seeds of both the ben oil used by watchmakers is obtained. The roots are an excellent substitute for horse radish. The other variety is horse radish tree, which yields an inferior gum very plentifully; seldom seen in the forest; more common near villages; grows very rapidly, but is very short-lived. Beans eaten in curry. Bark used for embrocations. No use as timber.

No. 87. Bamboo, Bambusa arundinacea, *váns*. The very large kinds of bamboos are not found in the Gujarát circle, but they run up to a good size, say ten inches in circumference at the butt in the Dángs. Seed sometimes boiled and eaten in seasons of scarcity. Well known and used for various purposes. Young shoots are made into pickles.

No. 88. Murraya kœnigii, *mitho limdo*. Very similar to the common nim, but much rarer. Leaves used in native cooking as a condiment.

LIQUOR YIELDING TREES.

No.	English name.	Botanical name.	Vernacular name.
89	Palmyra	Borassus flabelliformis	*Tád.*
90	Bastard Date	Phœnix sylvestris	*Khajuri.*

No. 89. Palmyra palm, Borassus flabelliformis, *tád.* Not common throughout the whole Gujarát. One or two may be seen here and there towering above the other trees and serving for a landmark; yields *tádi,* a well-known intoxicating drink made from the sap. Leaves used for thatching and basket work; wood sometimes used for water conduits.

No. 90. Bastard date-palm, Phœnix sylvestris, *khajuri.* Not common throughout Gujarát. Found in abundance in the Surat district; yields *tádi*; contains sugar in considerable quantity. Leaves used for matting and basket work. Fruit eaten by poor people, but not palatable. Wood sometimes used for ridge poles of temporary huts.

SHADE TREES.

No.	English name.	Botanical name.	Vernacular name.
91	....	Terminalia arjuna	*Panio sádado.*
92	....	Ficus glomerata	*Umbardo* or *gular.*
93	....	Lagerstrœmia parviflora	*Bondára.*
94	....	Sterculia urens	*Kaddi, kullin,* or *kangdoli.*
95	....	....	*Moyna.*
96	....	Melia azadirachta	*Bakkan limdo.*
97	Banian or Indian fig-tree ..	Ficus bengalensis	*Vad.*
98	Pipal (holy fig-tree)	Ficus religiosa	*Piplo.*
99	....	Ficus tsiela	*Pipad.*
100	....	Azadirachta indica	*Limdo.*
101	....	Pongamia glabra	*Karanj.*
102	....	Ulmus integrifolia	*Kamraj* or *vdvli.*
103	....	Ailanthus excelsa	*Aduso.*
104	....	Polyalthea longifolia	*A'sopálav.*
105	....	Cordia rothii	*Gundi.*
106	....	Cordia myxa	*Gadgund* or *vadgund*
107	....	Albizzia lebbek	*Dholio saras.*

No. 91. Terminalia arjuna, *panio sádado.* This tree is found only in forest tracts near water-courses. The timber is seldom used for house-building or other purposes.

No. 92. Ficus glomerata, *gular,* or *umbardo.* Found throughout Gujarát in forests and occasionally near villages and in fields. The fruit, which is much sought after by bears, is sometimes eaten by the forest tribes. The leaves are a favourite fodder for goats.

No. 93. Lagerstrœmia parviflora, *bondára.* Though sometimes used in building huts, its timber is useless for ordinary purposes.

No. 94 Sterculia urens, *kadái,* or *kangdoli.* It yields large quantities of gum, but of so inferior a kind as to have no market value.

No. 95. *Moyna* or *moghal.* This tree like the last yields a large quantity of very inferior gum.

No. 96. Melia azadirachta, balkan limdo. Handsome tree, grows fast, and would do for road side. Bark used medicinally for worms.

No. 97. Banian tree, Ficus bengalensis, *vad*, No. 98, Ficus religiosa, *piplo*, and No. 99, Ficus tsiela, *pipad*, are common in Gujarát as they are all over India. They are often planted as shade trees in avenues along roads or on open spots near and within village towns. The wood of these trees on account of their religious character is not used even for fuel. The leaves of No. 97 are a most favourite fodder for goats, and the ends of the pendent roots are much esteemed as tooth sticks. The milk is used medicinally. The holy fig-tree No. 98 is worshipped by native females on various occasions. Among other blessings the worship of this tree is held to procure to the worshipper (1) children; (2) a husband's favour; (3) personal salvation. It is also considered to be haunted by the spirits of the dead, to whose movements is attributed the constant agitation of its leaves even when there is apparently no wind. Cattle and birds eat the figs of No. 99, and its milky sap is used for bird lime.

No. 100. Nim, Azadirachta indica, *limdo*. The nim common in all parts of the province is a valuable road-side tree. By the natives its shade is considedred particularly healthful, as well as cooling, while the bitterness of its juice saves the tree from the attacks of white ants. Its leaves are useful as fodder for camels. The skin is also supposed to have valuable medicinal properties, a decoction of the bark being a favourite drink in cases of fever, while a plaster of boiled nim leaves and the earth of white ant's nest is considered a first-rate application for reducing inflammation. The seeds are collected by the poor, and when crushed afford an oil for lamps. The timber though strong is not much used. On their new year's day *Chaitra suddha Padvo* (March-April), Hindus, especially Deccani Bráhmans, drink a juice extracted from the leaves of the nim. This they do, believing that the lives of all who begin the year by drinking nim juice will be spared till its close.

No. 101. Pongamia glabra, *karanj* or *kannaj*. Useful and ornamental as a road-side tree. The fixed oil expressed from its seed is used as an external application in cases of ringworm and other skin diseases in men, and as a cure for mange in dogs and cattle. Mixed with paste and wool this oil is used in the manufacture of country felt.

No. 102. Ulmus integrifolia, *kamraj* or *vávli*. The *kamraj* is by the natives believed to be the male of the foregoing. But this is not the case, as each tree bears its own seed. Though in some ways much alike the *karanj*, it can be easily distinguished by the want of polish on its leaves and by its bolder habit of growth.

No. 103. Ailanthus excelsa, *aduso*. The large leaves of this tree are a useful fodder for camels.

No. 104. Polyalthea longifolia, *ásopálav* or *ásupál*. Looks like mango and is found occasionally wild about the fields; a handsome erect growing tree having long wavy shining leaves. The leaves are used in marriage ceremonies for covering *mándvás*. It is found but rarely in the Panch Mahäls jungles.

No. 105. Gum-berry, Cordia rothii, *gundi*. Found commonly near villages and in fields. Fruit made into pickle.

No. 106. Cordia myxa, *vadgundi*. Is as large as a small cherry, and so sticky that when you have once bitten it you can hardly again open your mouth. This tree has, however, broader leaves than its sister gumberry; grows to a much greater size, gives a good shade, and is more common in the fields.

No. 107. Albizzia lebbek, *dholio saras*. Light-coloured wood fairly strong, but not much used. Hardly to be considered as a timber tree.

MISCELLANEOUS TREES.

No.	English name.	Botanical name.	Vernacular name.
108	......	Acacia tomentosa	*Anjar.*
109	......		*Ateri.*
110	......	Balanites roxburghii	*Hingori.*
111	......		*Mindhal.*
112	......	Morinda citrifolia	*Al.*
113	......	Thespesia populnea	*Bhindi* or *pdlaspiplo*
114	......	Adansonia digitata	*Chorámla.*
115	......	Alangium lamarckii	*Anklo.*
116	......	Canarium strictum	*Gugal.*
117	......	Nauclea	*Andrak.*

No. 108. Acacia tomentosa, *anjar*. Not much used. Cart wheels are sometimes made of it.

No. 109. *Ateri*. In a green state its very fibrous bark is used by Bhils for cord in building their huts and for other purposes.

No. 110. Balanites roxburghii, *hingori*. The nut yields oil, and dried and hollowed out is made into crackers.

No. 111. *Mindhal*. Dried fruit is tied on the wrist of the bride-groom during the marriage ceremony.

No. 112. Morinda citrifolia, *al*. Grows into a tree if allowed, but its wood is of no value. It is grown for the madder dye which its roots and bark yield.

No. 113. Thespesia populnea, *bhindi* or *pálaspiplo*. Not a forest tree. Found over the province—grows from cuttings—the leaves are used as a dressing to keep open wounds. Reddish brown timber—very strong—used in the gun carriage manufactory. Not seen in Kaira, Panch Mahâls, or Ahmadabad.

No. 114. Adansonia digitata, *chorámla*. Found scattered all over Gujarát, but not very common. Fruit used for floats and sometimes for an acid drink. Bark used for making ropes, but not in Gujarát. The timber is too soft for any useful purpose.

No. 115. Alangium lamarckii, *anklo*. Has willow-shaped leaves, and in the hot weather rather pretty whitish flowers with very long stamens.

No. 116. Canarium strictum, also called *gugal*, rather stouter without the papery bark or the elegance of branch and foliage. The leaflets are large and fewer.

No. 117. The *andrak*, a less common and larger growing tree, is in February covered with small round heads of yellowish flowers. It yields a fine white wood, and when cut throws from the stool several straight sapplings.

HEDGE PLANTS.

No.	English name.	Botanical name.	Vernacular name.
118	The mustard tree of the Bible...	Salvadora persica	*Pilvu.*
119	Milk bush	Euphorbia tirucalii	*Kharsáni.*
120	......	....	*Ratanjog.*
121	.....	Streblus asper	*Sarera.*
122	.....	Ficus asperrima	*Kalámbar.*
123	.....	.. ..	*Pelvan.*
124	Thorny milk-bush	Euphorbia neriifolia...	*Thor.*

No. 118. Salvadora persica, *pilvu*, is common among the hedges. Though not growing above 20 feet in height it has a very bushy head of slender drooping branches covered with bright green oval leaves. It bears bunches of red berries tasting like cress, of which small birds are greedily fond. Bark of the root bruised raises blisters on the skin. This tree indicates a salt soil. Supposed to be the mustard tree of the Scriptures.

No. 119. Milk bush, Euphorbia tirucalli, *kharsáni*. This shrub is used very extensively for hedges. The wood is said to be good for gun-stocks, but it seldom grows large enough for the purpose. Is made into charcoal for gunpowder. The milky sap is used by natives as a blister.

No. 120. *Ratanjog*. Generally a shrub and used as a line fence; sometimes grows into a tree.

No. 121. Streblus asper, *sarera*. A very common tree in hedges and about villages. It is small and scraggy with a gnarled trunk, not unlike an English thorn tree.

No. 122. Ficus asperrima, *kalámbar*, is the fig with large and exceedingly rough leaves, often used as sand paper. Its greatest peculiarity is that at least when young the branches are jointed and hollow.

No. 123. *Pilvan*. Oil extracted from the nut is used in cases of rheumatism. No use as timber.

No. 124. Thorny milk-bush, Euphorbia neriifolia, *thor*. It is most generally used for hedging.